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THE

# MEDICAL JOURNAL OF AUSTRALIA

VOL. II.—9TH YEAR.

SYDNEY: SATURDAY, DECEMBER 2, 1922.

No. 23.

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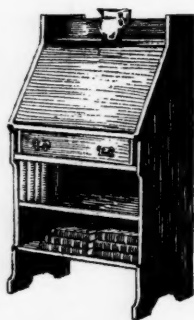
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### OBSTETRICAL EXPERIENCES DURING FIFTEEN YEARS OF GENERAL PRACTICE.<sup>1</sup>

By H. GILBERT, M.B., B.S. (MELB.), F.R.C.S. (ENGLAND),  
Honorary Medical Officer, Queen's Home, Adelaide.

WHEN I was invited to read a paper on some obstetrical subject at this meeting, I appreciated the compliment, but rather dreaded the responsibility, owing to the feeling that I fell short in the complete scientific knowledge of any particular branch of the subject necessary to interest the members sufficiently. I have selected the title of my address with a certain amount of diffidence, as I am well aware that many of you have had a much wider experience than myself and probably seen more interesting cases. However, I venture to recount my experiences and impressions in the hope that they may prove of some interest and call forth some not altogether unfriendly criticism and reminiscences from others.

During the period under review I have personally conducted something over eight hundred cases and had the privilege of seeing a number of others with my friend, Dr. Marten, and other practitioners; since October, 1912, four hundred and seventy cases

have passed through my hands at the Queen's Home and I am indebted to the Committee of that institution for the opportunity of publishing the reports of cases of interest.

I must admit that I started rather badly equipped for a career in midwifery. The teaching of my student days was much the same as at the present time. I saw my requisite twenty cases, including one application of forceps by a house surgeon in 1901, and I did not have the opportunity of seeing another case until I joined Dr. Marten in 1907. Consequently, I was grateful to the matron of the nursing home where I had my first forceps case, for tactfully suggesting that it might be easier if I applied the lower blade first.

I have seen the passing of the old-fashioned midwife, ringletted, self-satisfied and septic, who greased the passages, tried the pains (in one case with such vigour that the patient assured me that the baby's hare lip and cleft palate were the result of her forceful manipulations) and made up for her many enormities by copious douches of Condy's fluid the colour of ink during the puerperium; who crooned what she considered apposite texts during the progress of the pains and compared my policy of “wait and see” very unfavourably with that of her own doctor, who would have applied forceps the moment she sent for him, and finally encouraged

<sup>1</sup> Read at a meeting of the South Australian Branch of the British Medical Association on September 28, 1922.

the exit of the placenta by the invocation: "Blow on the back of yer 'and, dearie!"

You might suppose from this diatribe that under this régime none of my cases went right, but, as a matter of fact, none of them went wrong, despite the fact that I seldom wore gloves, unless for my own protection in a case of doubtful antecedents or unless I had been handling some dirty case. In this connexion I would like to define my attitude towards gloves. It is simply this, that, try as I might, I have not been able to develop my tactile sense with gloves on to such an extent that I can depend on it without the aid of sight. I generally use them to commence any prolonged operation, such as manual dilatation of the os, but discard them when applying forceps or performing internal version subsequently. In a recent case requiring *accouchement forcé* and delivery by the breech, I kept them on all through the procedure and regretted doing so later, as, in attempting to free the first arm, I snapped the humerus through lack of proper tactile control.

I know such practice savours of heresy, but I have only had one fatal case of streptococcal infection and that occurred in the course of an epidemic, concerning which I knew nothing at the time, and, as the patient had profuse *post partum* hæmorrhage with retained placenta, I regarded myself at first as the infecting agent, owing to the many manipulations necessary, although I was at a loss to explain the advent of the infecting organism.

With your permission I will now quote what have appealed to me as some of the more interesting abnormalities encountered.

#### Eclampsia and Pre-Eclamptic Toxæmia.

Taking first the allied conditions of eclampsia and pre-eclamptic toxæmia, I have seen fifteen cases with convulsions and sixteen in which the condition ranged from a severe albuminuria with comparatively few symptoms to the more serious type associated with headache, dimness of vision, persistent vomiting, etc., indicating the likelihood of a fit at any moment. Some of the latter series have, I think, been prevented from passing into the more severe category by the treatment adopted.

Of the whole series of thirty-one cases, twenty occurred in primiparæ and of the fifteen patients in whom convulsions occurred, eleven were primiparæ; this shows that my cases conformed to the usual experience. The case incidence is considerably in excess of the numbers usually quoted. Statistics give the incidence for private practice as one in 500, for hospital practice as one in 160, whereas my figures show one in 114 and one in 58 respectively.

MORTALITY IN ECLAMPSIA.

Patients.	Number.	Mortality.	
		Mothers.	Children.
Private .. ..	7	1	2
Hospital .. ..	8	4	4
Total .. ..	15	5	6

In spite of the fact that in some patients severe and fatal convulsions occur after delivery, I must state that I always feel happier when the uterus is empty and, unless the toxæmic condition develops too early in the pregnancy to admit of the birth of a viable infant, I always endeavour to secure this as early as possible if the symptoms are not relieved by treatment.

So complex is the condition and so involved is the question of prognosis with that of treatment that I will instance two opposite types of case:

The first patient was under the care of Dr. W. A. Hunter at Salisbury about ten years ago. When I arrived he was badly cramped in the effort to perform *accouchement forcé* on a primipara between seven and eight months pregnant who was completely comatose and almost black from cyanosis. After many changes of shift at dilatation we succeeded in extracting the legs, but on endeavouring to complete delivery the body parted company from the head, which remained in the uterus. Fishing for the head with forceps proved futile and an endeavour to extract it by inserting a finger in the mouth caused the lower jaw to carry away. Ultimately extraction was successfully performed by hooking a finger into the *foramen magnum*. The whole proceeding was lengthy; I have not the record in hours, but it seemed like days and, except that her uterus was empty, I left the patient in the same condition as on arrival and expected to hear of her early decease. I subsequently heard from Dr. Hunter that she gradually regained consciousness after about three days and he has recently told me that she has since had one miscarriage and also given birth to two children without much trouble.

Contrast with this the history of a primipara who had been in labour about eighteen hours. There was no albumin in the urine two days prior to labour and she seemed well when I saw her shortly after the commencement of labour. Later she had one convulsion when sitting on the commode after an enema. When I arrived, the convulsion had passed, leaving her in a somewhat dazed condition, but able to answer questions apparently intelligently. A catheter specimen of urine was heavy with albumin. Under chloroform anaesthesia I corrected an occipito-posterior position and delivered easily with forceps and, I think not unnaturally, expected a satisfactory recovery. An hour later I was called to her again and found that she had not come round from the anaesthesia, but had drifted into a state of coma, with extreme pallor, from which she never rallied, dying about an hour later, in spite of every effort at revival by stimulants and saline injections.

Although it is generally considered that the mortality becomes graver in proportion to the number of convulsions, this second case was certainly an exception to the general rule.

Let me cite another case in a primipara who was very anxious, as her sister had died of eclampsia and she herself had been treated for Bright's disease ten years previously. She consulted me when in the fifth month of pregnancy. The urine contained a considerable amount of albumin, which diminished with dieting and rest, but did not disappear. At about the eighth month she had a severe "bilious attack with headache and dizziness." The quantity of urine diminished to one hundred and eighty cubic centimetres (six ounces) and I expected a storm and advised the nursing home accordingly. She was not prepared to go into the home till labour started or the worst happened and gradually got over the attack by resting at home. She finally came to a normal labour in which Dr. B. Swift attended her and an examination of the urine at that time showed it to be free of albumin.

To quote one more case, that of a young primipara at the Queen's Home in the clinic of Dr. T. G. Wilson last month and looked after by Dr. Brian Swift and since under my care. When admitted she was very œdematous, was vomiting frequently; her urine was scanty and was nearly solid with albumin and, as Dr. Swift said, she "looked like having a fit at any minute." Hot packing,



purgation, "Veratrone," diuretic mixtures at first appeared to have little effect, but I was able to report to Dr. Swift that two days after he handed her over to me she had passed three litres (one hundred and four ounces) of urine in addition to bowel actions. Ever since then she has passed anything from one and a half to three litres daily and the Esbach test registers between 2% and 3% of albumin. If the condition does not further improve, I should be inclined to induce labour as soon as the child is definitely viable.

This case shows what in some instances can be achieved by persistent treatment, but the treatment of the condition in general must, as in other diseases, be as far as possible one of prophylaxis and when our patients are sufficiently intelligent, we may hope for good results. That they are not always intelligent, in spite of past experiences, is shown by the following example:

A woman pregnant for the second time, when engaging me, told me that she had severe eclampsia with her first pregnancy and had lost her baby. Her urine was free of albumin at the time, but I emphasized the instructions I always give my patients, namely, to start sending in samples at fortnightly intervals from the beginning of the seventh month or earlier or oftener if any symptoms arise. When the patient lives in the country, as this one did, I undertake to write immediately if any particular sample is abnormal; otherwise she is to assume that the sample is satisfactory. I received a normal specimen from this patient at the seventh month and had no more. The next I heard of her was when Dr. Brian Swift attended her one night for two convulsions. She had been in town for several days ill and oedematous, with diminishing secretion of urine, but had not sought advice. I saw her next morning with Dr. Swift. She had no more fits, but was vomiting persistently and secreting no urine and was apparently not in labour. By the afternoon, however, labour was well advanced and I was able, with Dr. Swift's assistance, to deliver a live child by the breech with a broken left humerus. During the twenty-four hours following delivery she passed 5.3 litres (184 ounces) of urine and promised well, but on the third day she developed a right basal pleuro-pneumonia from which she took nearly three weeks to recover. She is now well except for a faint remaining trace of albumin in the urine. If she had carried out my original instructions or had consulted me on arrival in town, a timely induction of labour would probably have saved her family and her medical advisers much needless anxiety and avoided injury to the child.

It has come to be recognized that as a rule with progressive toxæmia the blood pressure tends to rise and I regard a rise to one hundred and sixty millimetres or over as indicating an impending convulsion, though I have successfully induced and completed labour in a patient with a blood pressure of two hundred and twelve millimetres without the occurrence of a fit. This patient lived for some years, but never completely recovered from her toxæmia and, though her urine became free of albumin, she continued to have a persistently high blood pressure—one hundred and sixty to one hundred and eighty—and suffered from tachycardia.

As an all-round drug in the treatment of eclampsia I think morphine is the best. "Veratrone" as a circulatory depressant I have only used occasionally and then had to discontinue it owing to over-depression.

As to the anæsthetic to be used in these cases when such is necessary, it is questionable whether chloroform is suitable, owing to its tendency to aggravate acidosis and its use for the second patient mentioned above may have had some influence in producing a fatal result.

As a means of relieving the final pains of labour chloroform is excellent, but for full anæsthesia when working single-handed I always use ether.

Abdominal Cæsarean section as a treatment of eclampsia I am unfamiliar with, but imagine its applicability to be limited to cases with badly contracted or obstructed pelvises. Vaginal Cæsarean section I have once performed easily, but unsuccessfully, as the patient was deeply comatose after many convulsions and never rallied and the fœtus was still-born. This latter operation I consider to be preferable where it is desirable to empty a uterus rapidly when the cervix is undilated or undilatable.

#### Placenta Prævia.

Secondly I will crave your indulgence while I deal shortly with that other principal bugbear of midwifery practice, *placenta prævia*.

I have seen thirteen patients with *placenta prævia*, three in my private practice, nine in my clinic at the Queen's Home and one in consultation with the late Dr. A. C. Magarey. The patient I saw with Dr. Magarey had the central variety and labour had not definitely started; I had the privilege of assisting him with a successful Cæsarean section.

The number of cases far exceeds the average incidence, which is given as one in 1,000 in private practice and one in 250 in hospital practice, whereas my figures show one in 266 and one in 52 respectively.

The first patient I saw caused me considerable anxiety, as I arrived to find the patient apparently hopelessly exsanguinated, with blood dripping on to the floor after having soaked through the thick mattress of a double bed. I packed the vagina tightly and sent her into hospital and subsequently under anæsthesia extracted a foot and left her to complete delivery as the bleeding had apparently stopped. Under the influence of saline infusions and free stimulation she was able to keep going and finally delivered herself with very little further assistance. As was to be expected the child was dead.

Of the twelve cases occurring in my private and Queen's Home practice the maternal mortality has been nil, the fetal mortality seven. Of the five live infants, only one was born by the breech, indicating that breech deliveries are apt to be fatal. All the patients were multiparæ.

With regard to the treatment, I think that a case of central *placenta prævia* with undilated cervix is suitable for Cæsarean section. In the majority of cases, however, dilatation is present or possible and the more conservative methods are probably better.

#### Birth Injuries.

Of the rarer injuries to the mother, I have seen one case of rupture of the bladder occurring after prolonged labour with a large child in a persistent occipito-posterior position. The subsequent plastic operation performed by Dr. R. H. Marten was a brilliant success.

Three children have suffered fractures, two of the humerus and one of the femur. Perfect results were obtained in all three by utilizing the trunk as a splint.

There occurred one case of depressed fracture of the skull which unbuckled as the brain grew.

#### Abnormalities of the Fœtus.

Of the grosser abnormalities of the fœtus, I have seen the following conditions:

There was one case of conjoined twins which I have previously shown, but show again to-night on account of the extreme rarity of the condition, monsters being estimated to occur once in 4,566 cases.

There was one case of imperforate anus which was successfully treated by operation.

There were two cases of anencephalus, the first of which it was possible to diagnose by touch through the unruptured membranes, the second associated with considerable hydramnios and toxæmia. This fœtus had other deformities in the shape of *spina bifida* and *talipes*.

There was also one case of multiple deformities which included exomphalos, *spina bifida* and *talipes*, one case of imperforate urethra and cystic kidneys. The mothers in these two latter instances also manifested symptoms of toxæmia.

#### Other Rare Conditions.

In the whole series I have only seen two face presentations, whereas the average incidence is estimated as one in two hundred and fifty.

I have seen and previously reported one case of mesenteric thrombosis, one case of emphysema of the chest, back, neck and face resulting from the strain of labour and one case of hemiplegia apparently resulting from the same cause.

Embryotomy has once been compulsory and it is hoped that a repetition will not occur again in my practice as it was a most ghastly proceeding. I am happy to say that I have since been able to deliver the same patient of a healthy baby by inducing labour on Dr. Wilson's advice at the thirty-sixth week. I may here add that in the five women in whom I have induced labour on account of some previous disaster, owing to want of proportion between fœtus and pelvic outlet, I have only once had what can be termed an unsuccessful result. In that case the child's head was badly bruised at birth and it died of some form of meningitis six months later.

Did time permit numerous other matters could be dealt with, such as the morphine-hyoscine combination for easing labour, which I once denounced at a meeting of this Branch, but now use systematically, having become convinced of its usefulness, not only in affording the woman in labour some of that relief to which she is justly entitled, but also in helping to prevent much of that meddlesome interference with normal processes which leads to so much subsequent ill-health. I would also have liked to have discussed the use of that valuable drug, pituitrin, which I first misapplied by administering to a primipara with the fetus in what later proved to be a persistent occipito-posterior position and to have detailed two rash experiments with Bossi's dilator, but I will close my remarks by thanking you for your tolerant hearing and expressing my indebtedness to those gentlemen with whom I have been fortunate enough to have been associated in my work.

#### THE VALUE OF THE COMPLEMENT FIXATION REACTION IN GONOCOCCAL INFECTIONS.

BY ALLAN S. WALKER, M.D., CH.M.,  
Sydney.

IN 1906 Müller and Oppenheim, followed by Bruck, described successful demonstrations of the fixation of complement in gonococcal infections. Since that date a number of workers have made contributions to the subject and have placed the study of the serum on a sound basis, yet there exists uncertainty on a number of points, especially as regards the exact value of the test in clinical work. The admirable summary of the Medical Research Committee in England<sup>(1)</sup> epitomized most of the current information, but even the various technique advised show certain wide differences and the place of the procedure in the diagnostic armament of the pathologist and clinician remains uncertain.

Others writers (see References<sup>(2)</sup> to<sup>(18)</sup>) have testified to the usefulness of this test and the work upon which the present observations are based, was undertaken in order to make a local contribution to a subject hitherto little dealt with in Australia. This and other work which it is hoped to present in further articles, was carried out in connexion with a research scholarship in venereal disease endowed by the Commonwealth Government. For the opportunities thus afforded me I have to thank the Federal Department of Health and in particular Dr. Cumpston, the Director, for his continued interest and encouragement.

The observations collected here were made largely in the Venereal Diseases Clinic of Sydney Hospital, by the kind permission of the Hospital Board, and my thanks are due not only to that body, but also to the Honorary and Resident Medical Officers of the Hospital for their cooperation and assistance.

From August, 1920, to the beginning of 1922 a series of four hundred and fifty patients was studied, over three hundred and fifty of these being under observation for periods of several months. In addition to these there was a series of sixty patients who were being treated for complications of gonorrhœa with an antiserum and in all these the serum reactions were also investigated. The majority of the patients were males, since objective information, though often difficult to obtain, is at least less unreliable than in the female. Only one examination was made of the serum of about one hundred patients. This was due to several causes; firstly, in a number of cases a single test was made to insure that a complement fixation was being obtained in the presence of frank complications; secondly, in a few a single test was done to give additional evidence of non-infectivity in patients returning after their cure had been pronounced (for instance, when they contemplated marriage); and, thirdly, a certain proportion of out-patients in a venereal diseases clinic belong to a floating population and vanish. As far as possible those patients were selected for test whose clinical condition was most thoroughly examined.

In all cases the same routine was observed. A clinical history was taken and kept and the sera were tested without reference to this data. The results were compared with the history and past records of tests and, where it appeared to be indicated for any reason, the test was repeated *de novo*. In this way it was sought to discover possible errors of technique and to arrive at a correct estimate of the meaning of the serological findings.

Those tests being selected whose accuracy could be checked by clinical observations, the results work out as follows in a series of over one thousand tests:

Results.	Frequency.
Strongly Reacting Sera (+++) .. .. .	11%
Reacting Sera (++) .. .. .	23%
Feebly Reacting Sera (+) .. .. .	28%
Not Reacting Sera .. .. .	38%

The interpretation of these results will be dealt with later, but the importance of the feeble reaction may be noted in passing. It may also be stated here that the intensity of this reaction is not in general comparable with that of the Wassermann test and it is essential that the method adopted for carrying out the complement fixation test in gonorrhoea should be one capable of demonstrating small concentrations of putative antibodies in the serum.

The stages and complications of gonorrhoea in which a positive reaction may be elicited, are well established and the results of the present inquiry were in harmony with other published work on the subject. That is, fixation of complement is usually not observed until the second week of the disease or later and not then if the infection be a strictly limited and slight one involving the anterior part of the urethra only. It is usually found in cases with complications and shows its greatest intensity in metastatic or generalized infections. The reaction may be demonstrated for a variable time after cure and gradually diminishes and disappears in the course of several months.

The following table shows the proportion of complicated cases giving a definite reaction. This series only includes patients seen in the regular routine of the Out-Patient Clinic and not selected for special observation or treatment; the figures comprise only cases in which there was satisfactory evidence that the particular lesion existed at the time of testing. Multiple tests on the same patient are excluded.

Complication.	Fixation of Complement.	No Fixation of Complement.	Total.
Prostatitis .. .. .	147	13	160
Epididymitis and Orchitis .. .. .	32	1	33
Arthritis .. .. .	19	2	21
Folliculitis and Urethral Infiltration .. .. .	14	0	14
Vesiculitis .. .. .	22	3	25
Proctitis .. .. .	2	0	2
Salpingitis .. .. .	7	1	8

In later work carried out on patients specially picked out for the treatment or investigation of some particular complication it was found that a positive finding in the serum was virtually invariable. Thus out of sixty cases of complicated gonorrhoea selected for treatment with antigonococcal serum only two failed to yield a reaction to the test and these gave a weakly positive result on re-testing. In these cases, as doubtless in others, the fault lay with the technique, as on the occasion of the first testing the more sensitive method of fixation in the cold was not employed.

A general concord with the accepted results of this test having been established, the question of technique may now conveniently be considered.

#### TECHNIQUE.

##### Corpuscle Emulsion.

Both human and sheep corpuscles have been used in the present work, chiefly the latter. The human hæmolytic system, eliminating the possible error caused by the presence of anti-sheep amboceptor in the sera tested, is slightly more sensitive, but the higher titres of anti-sheep hæmolysin make it more suitable for routine use. The emulsion employed for practically all this work was 5%. It is of the utmost importance that a regular and standard technique be employed in the preparation of the emulsion. If the centrifuge be spun for a longer or shorter time the strength of the corpuscle suspension will vary, as also if the revolution rate vary. Lewis<sup>(19)</sup> has recommended the use of a specific gravity method, but without this refinement consistent results may be obtained by a careful and unvarying method. Calculation may also be made from the whole blood, reckoning the normal percentage of the blood volume occupied by the corpuscles.

##### Amboceptor.

As stated above, an anti-sheep hæmolysin has been used for the great majority of tests, one prepared in the Medical School and also that marketed by the Commonwealth Serum Laboratories yielding very good results. The amboceptor has been kept a constant in these tests and with a multiple tube method, which is essential in this work, it has been found best to use increasing doses of complement with fully sensitized corpuscles.

The method of sensitizing used has been that recommended in No. 4 method of the Medical Research Committee's report on the Wassermann test,<sup>(20)</sup> five minimum hæmolytic doses of the hæmolysin being used.

##### Complement.

Guinea-pig serum, fresh and of proved potency, has been almost exclusively employed. In the complement fixation tests for syphilis and tuberculosis Gradwohl and also Goldenberg and Field<sup>(21)</sup> have used the complement in the patient's own serum. I have tried this method, but when all due safeguards of titration of the complementary strength are adopted, it offers no advantage. The failure to react is probably to be trusted more than the reactions, especially if these latter are not strong.



Accurate titration is even more essential here than in the case of the Wassermann test. The usual method is to incubate sensitized corpuscles with equal quantities of complement diluted 1:10, 1:20, 1:30, 1:40 up to, say, 1:120. As the quantities of complement used in this trial increase by irregular increments, greater exactness may be attained if the minimum hæmolytic dose falls within the higher dilutions than if it falls within the other end of the scale. This may be overcome by interpolating dilutions in order that the series may more nearly approximate to an arithmetical progression. Abrupt transition from no change to complete lysis in contiguous tubes leaves room for doubt and should be regarded with suspicion.

It is advisable to titrate complement in the presence of antigen, as advised by Thomson in his method.<sup>(1)</sup> The method found most satisfactory in the present investigation is as follows:

Two sets of tubes are put up in the preliminary titration, one with and one without antigen (the average dose of antigen having been previously determined). These are incubated one hour at 37° C. and the results, read fifteen minutes after the other components of the hæmolytic system have been added, give us the minimum hæmolytic dose of the complement and also tell how much complement is absorbed by the antigen. A tube containing the positive control serum may be included with advantage to insure the activity of the antigen.

Experience comes into play here in assessing this evidence and in selecting the dilutions to be used in the test. Three quantities of complement are employed to obtain some measure of the intensity of the reaction. The smallest amount used may be two minimum hæmolytic doses, *plus* the allowance made for the complement absorbed by the antigen, or at least two and a half minimum hæmolytic doses with the same addition if the method of long fixation on the ice be used. The ratios between the successive quantities may be  $2\frac{1}{2}:3:3\frac{1}{2}$ , following Thomson, or 3:4:5. In practice the minimum amount of complement used is generally in the neighbourhood of three minimum hæmolytic doses.

As it is probable that complement is "fixed" or "deviated" according to the laws governing adsorption, the quantity of complement bound by increasing concentrations of antibody (in combination with antigen) may not follow a simple linear relation, but rather the general formula of adsorption. If  $A$  be the amount adsorbed from a solution, the amount adsorbed from a solution of double concentration is not  $2 \times A$ , but  $A \times 2^{1/n}$ , where  $n$  is a constant.

The practical outcome of this consideration is that the varying quantities of complement used in the test should not rise by too large an increment if small differences of antibody content in the sera examined are to be detected and also that the exact quantitative value of results of complement fixation experiments must not be unduly strained in the clinical interpretations. A further reason for caution in the latter respect is that variations in complement may cause varying results in the same sera at different times, as proved by Harrison<sup>(22)</sup> by weekly tests of frozen sera.

#### Serum.

The quantity of serum used is important. One method of carrying out the test is to employ diminishing quantities of serum with all other factors constant. In performing a series of tests in this way, I have found that greater concentrations of a reacting serum do not invariably yield a reaction proportionately stronger. This may be due to the presence of natural amboceptors or to the occasional appearance of the phenomenon of "zones of inhibition" such as occur in agglutination work. The former source of error, as pointed out above, may be avoided by the use of a human hæmolytic system, but appropriate dilution of the serum will render any such fallacy negligible. A dilution of serum 1:5 will give good results, but for long fixation on ice with small doses of complement there is a risk of this serum dilution being sufficiently anti-complementary to delay or inhibit lysis in the controls. Thomson has advised using the serum 1:20, but very good readings may be obtained with a 1:10 dilution without any sacrifice of sensitiveness.

The method of inactivation used should always be the same. A period of fifteen minutes at 55° C. is sufficient, preferably on a water bath. In the greater number of the tests carried out in the present instance the serum was diluted before inactivation. In a series of sixty clinical cases parallel tests were made with serum heated before and after dilution and there appeared to be sufficient gain in the added sharpness of the readings in the latter instance to warrant the employment of this method as routine.

#### Method of Fixation.

The method of "fixation" of the complement by incubation for one hour on a water bath or in a thermostat gives good results and no strongly reacting serum will thereby fail to give a definite reading. Much more accurate and convincing results are obtained by long fixation at ice-chest temperature. Numbers of observers<sup>(1) (8) (16) (23) (24) (25) (26) (27)</sup> have praised this refinement in complement fixation work and without doubt it is a great gain in sensitiveness in that without it the weaker reactions are often missed, while doubtful readings with the shorter method become less equivocal and usually definite by this means. Following the adsorption laws, the rate of complement deviation proceeds more rapidly at the higher temperature, but the slower rate near zero is more than compensated by the greater completeness of the process.

After a long period on the ice (say eighteen hours) lysis is sometimes a little delayed, as the rate of deterioration of complement is uncertain, but false results are not obtained if adequate controls be employed. Only on three occasions were the results not clear and the series in each case was repeated, but these accidents appeared to be due to an error in the balance of the hæmolytic system, a source of trouble which increase in experience eliminates to a large extent.

A series of parallel observations was carried out on over two hundred and fifty sera. Of these a definite result was unaltered in nearly 60%. In 36% a distinct though in some cases weak reaction



was rendered perceptibly stronger and in 4% readings which would have been interpreted as no fixation or as incomplete fixation by incubator method, were transformed to partial or weakly reactions by the ice-box method. As these weak serum responses are often of importance (*vide infra*), the gain is considerable.

The racks of tubes may be left standing on ice for five or six hours, but the hour at which the corpuscles are added is often inconveniently late when this procedure is adopted. Leaving the tubes in an ice-chest at about 4° C. over night (seventeen to eighteen hours) and completing the test on the following morning gives very satisfactory results. Doubtless the more even the temperature can be kept, the more consistent will the findings be.

#### Reading of Results.

With cold fixation it is difficult to assign a definite period of incubation after adding the corpuscle emulsion. Though a large number of cold tubes assume the incubator temperature but slowly, this method has been used in preference to the water bath, as the lysis of the controls can be watched more deliberately. The first reading is taken as soon as the control tubes show lysis. Since the reaction is specific, with proper technique inhibition of lysis should be due to specific cause. This reading is confirmed by and compared with a second observation made ten to fifteen minutes afterwards. Prolonged incubation will often cause lysis in the case of some of the feebler reactions. This is merely a question of the accuracy with which the end-point of titration of complement is determined. It is better, however, to have the complement on the "sharp" side than to run the risk of failure of lysis in controls. Reacting and non-reacting controls must always be put up with each series. The non-reacting control should be fresh for preference. The reacting control may be a serum from the previous week kept on ice which yielded a strong fixation, but a simple and very satisfactory plan is to use an appropriate dilution of a polyvalent antigonococcal serum.

#### Quantities of Reagents.

There is no special advantage in using large quantities of each ingredient (*e.g.*, one cubic centimetre). With careful measurement by means of capillary or narrow bore pipettes, one-tenth quantities, *i.e.*, 0.1 cubic centimetre, of each may be used with excellent results. The readings can be more easily made with 0.2 or 0.25 cubic centimetre of each, bringing the total contents of each tube to about one cubic centimetre. For carrying out large numbers of tests with expedition and accuracy a drop method is very satisfactory.

#### Antigen.

This is the most important of all ingredients of the test and a special study of the various preparations was carried out. The problem was approached from several standpoints.

(1) Rabbits were immunized against single strains of the gonococcus and their serum used to investigate the value of various antigens prepared from the homologous strain.

(2) Antigens were made from fifteen collected strains and used in demonstrating the presence of complement fixing bodies in polyvalent antigonococcal serum (Parke, Davis & Company and the Commonwealth Serum Laboratories).

(3) Similar tests were carried out with anti-serum made from five selected strains by the Commonwealth Serum Laboratories and antigens containing these strains only. This serum was prepared for a special research into the value of an antiserum in the treatment of the complications of gonorrhœa through the kindness of Dr. W. J. Penfold.

(4) Practical trial was made of the various preparations in the weekly routine tests on patients' sera.

In all cases young sub-cultures were used (twenty-four to forty-eight hours) grown on either Thompson's medium or the citrated blood agar of the Commonwealth Laboratories.

The conclusions reached were as follows:

#### Need for Polyvalency.

This has been amply demonstrated by other workers. It was found in the present instance that six strains failed to pick up as many positive reactions as twelve. The five strains mentioned above (and these were not ascertained as serologically distinct), when used as an antigen, gave a reaction as intense as that obtained with fifteen strains in all but 20% of cases. The value of the polyvalent antigen is that the reactions obtained are of the maximum intensity. In the absence of a systematic classification of the Australian gonococci, all that can be advised is that ten to twelve strains be used for the antigen.

#### Age of Cultures.

Good antigens have been made from strains sub-cultured for many months, so that it does not appear to be essential to use young, freshly isolated strains.

#### Age of the Antigen.

A good antigen should be stable for several months, but all seem to fall off in potency, even when kept at a constant low temperature. Emulsions and the various extracts will keep for three to four months, as a rule, and as the minimal antigenic dose of an antigen decreases, the anti-complementary dose often increases, thus restricting the effective range of the preparation. Periodic titration is, of course, absolutely essential.

#### Reaction of the Antigen.

This is not likely to be a disturbing factor, but the effect of divergence on the side either of acidity or alkalinity is to make the antigen more anti-complementary.

#### Temperature Used in Preparation.

This has a decided influence. An unheated emulsion was found to have slightly greater potency than one heated to 55° C. for one hour. The effect of a temperature of 70° C. or 80° C. is to lower still further the antigenic capacity of a suspension of gonococci. In practice, heating to 55° C. gives more

assurance of sterility and lowers the strength but slightly.

#### *Methods of Preparation.*

(1) *Suspensions of Gonococci in Saline Solution.*—Autolysis will occur to some extent in a simple emulsion. Possibly this impairs its value somewhat, though even the supernatant fluid possesses some antigenic power. I have not found it less unstable than other preparations. If a number of strains of gonococci are kept growing in the laboratory, it is an easy matter to make a fresh emulsion at frequent intervals.

(2) *Autolysates.*—Included in this term are all those preparations made by breaking down the bacterial bodies, whether by a true autolytic process or by disintegration by heat or freezing. McNeil<sup>(28)</sup> advises heating in distilled water for two hours at 55° C., then spinning and filtering. This gives a good antigen, but it is questionable if it is superior to an emulsion. Blake<sup>(29)</sup> uses successive freezing and thawing to effect disintegration and Olitsky and Bernstein heat one hour at 60° C. and twenty-four hours at 37° C. The fractional extract method given below has yielded good results also.

(3) *Solutions of Gonococci.*—Merkwijew<sup>(30)</sup> and Thomson<sup>(1)</sup> have advised respectively a solution in antiformin and decinormal soda or potash, subsequently neutralized. This gives a good antigen which, when fresh, is only slightly anti-complementary.

#### *Fractional Extracts.*

##### *The Lipoid Fraction.*

Warden<sup>(31)</sup> <sup>(52)</sup> in 1915 recommended the use of lipoidal antigens in this test and has since been a very strong advocate of the claims of the lipoids to an important rôle in immunity.

Extracts of gonococci made with alcohol, ether or acetone will all display antigenic power as judged by the complement fixation test. In preparing such extracts the bacterial mass was shaken thoroughly for thirty minutes with the solvent and allowed to stand over night. This was repeated several times, after spinning and saving the supernatant fluid. The lipoids were freed of their solvent by evaporation and taken up in ether. By re-evaporation and solution in alcohol and filtration after centrifugalization the product must contain too small a trace of protein to possess antigenic power. It was found that it could fix complement with the serum containing antibodies for the gonococcus, but was inferior to other preparations of the whole bacteria. Warden's claim for special sensitiveness I have not been able to confirm, though perhaps the alcohol solvent may insure some extra degree of stability.

##### *The Lipoid-Free Fraction.*

The residue left after the above treatment shows much superior qualities. Several workers have used a lipoid-free antigen with success, e.g., Park and Williams,<sup>(33)</sup> Priestley<sup>(8)</sup> and Smith and Wilson.<sup>(11)</sup> These workers have extracted with alcohol and ether. I have used with very satisfactory results acetone as the extracting agent, a finding which is supported by the recent work of Douglas

and Fleming,<sup>(34)</sup> who have demonstrated the high antigenetic capacity (as judged by the results of vaccines and of immunization experiments) of acetone extracted bacteria.

After extraction the bacterial bodies may be suspended in saline solution or disintegrated (e.g., Park and Williams heat to 80° C.) in order to form a true solution. The somewhat untoward effects of the high temperature are here counterbalanced to some extent by the greater degree of homogeneity attained in the final product. The lipoid-free antigen compares favourably with others as regards potency and low anti-complementary value and is better than the majority of the other antigens as regards stability.

#### *Comparison Between Different Antigens.*

The following observations were made in order to make a more exact comparison between different antigens. Luxuriant forty-eight-hour growths of five strains of gonococci were carefully washed off with a minimal amount of normal saline solution, the resultant thick suspension was sub-divided and different antigens prepared from each aliquot part. These were tested to determine their anti-complementary dose and also their minimal antigenic dose in the fixation of complement with a dilution of the horse antiserum valent for these strains only. The following methods were used in the preparation of the antigens contrasted:

1. Fresh saline solution suspension of gonococci heated for one hour at 55° C.
2. A suspension was autolysed for two hours in distilled water at 55° C., centrifugalized, filtered and made isotonic.
3. A solution was made in decinormal sodium hydrate and neutralized with decinormal hydrochloric acid.
4. The supernatant fluid was obtained from a suspension autolysed on ice for two weeks with frequent shaking.
5. Gonococci were boiled in a 5% solution of antiformin in distilled water till dissolved; then the solution was neutralized with normal hydrochloric acid. Several volumes of 95% alcohol were added and the deposit separated by the centrifuge. The supernatant fluid was used (method of Krumweide and Noble<sup>(35)</sup>).
6. After autolysing a suspension in water at 60° C. for one hour and for twenty-four hours at 37° C. and then centrifuging, the supernatant fluid was made isotonic (method of Olitsky and Bernstein<sup>(36)</sup>).
7. Gonococci were dried at room temperature and extracted for three days at room temperature with successive quantities of alcohol and then ether. To this extract was added excess of acetone and the residue after filtration was taken up with equal parts of methyl alcohol and ether; this was allowed to evaporate to small bulk at room temperature. It was emulsified for use in saline solution.
8. Dried gonococci were ground with a glass rod, extracted for three days at room temperature with successive quantities of acetone; the residue was

dried in the incubator, finally washed with acetone, re-dried and ground up with saline solution and shaken thirty minutes. This suspension was heated for one hour at 56° C. and stood on ice for several days, being shaken at intervals. After spinning the supernatant fluid was used.

In the ensuing table it will be seen that the acetone-extracted residue was as potent as the original suspension, while it was much less anti-complementary. The two antolysed preparations and the neutralized solution in alkali were next in order of merit. It should be noted that all watery preparations need the addition of 0.5% carbolic acid to preserve them from contamination.

Antigen No.	Minimal Dilution Fixing Three Minimum Hæmolytic Doses of Complement with Antigono-coccal Serum, 1: 10.	Minimal Dilution Binding Three Minimum Hæmolytic Doses of Complement Alone.
1 .. ..	1: 180	1: 10
2 .. ..	1: 100	1: 10
3 .. ..	1: 90	1: 10
4 .. ..	1: 45	1: 7
5 .. ..	1: 40	1: 4
6 .. ..	1: 75	1: 10
7 .. ..	1: 40	1: 10
8 .. ..	1: 180	1: 2

To summarize, an acetone-extracted antigen loses nothing in potency and is less absorptive of complement than others, while the preparations recommended by McNeil and Thomson also show a good antigenic range. None of these methods yield an antigen of greater power than the original emulsion.

In practice the best have been found to be a gonococcal emulsion, a defatted emulsion, McNeil's and Thomson's preparations. Since it is necessary for a number of gonococcal strains to be available in a laboratory doing this work, it is questionable whether it is not the most practical plan to use a simple suspension in carbol-saline solution, making it up fresh at frequent intervals.

Since titration of any new antigen is imperative, I have not found any advantage in counting or estimating the bulk of the gonococci in any preparation.

#### CLINICAL APPLICATION OF THE TEST.

The frequency of the demonstration of a more or less feeble reaction has been remarked upon above. In the notation in common use complete inhibition of lysis in all three tubes in the test, that is, in each tube save that containing the serum control, is classed as strongly reactive (+++), lysis in the tube containing the largest amount of complement only as reactive (++) , inhibition in the tube with smallest amount of complement only as feebly reactive (+) and partial binding in this tube with all others clear as "partial positive" or "doubtful." In the presence of adequate controls even this last degree of reaction may be of significance.

In the cases investigated the concordance of the results of complement fixation tests with bacteriological examinations made at the same time was as follows: Strong reactions, 92% concordance;

moderate reactions, 90%; and feeble reactions, 82%. In all cases followed up by subsequent investigations the positive complement fixation was confirmed by other methods.

In twenty-two cases out of three hundred and eight tests which did not yield reactions, the patient was suffering from a demonstrable gonococcal infection, but in all these the serum yielded a response on later examination. No instance has been met in the present series in which the serum persistently failed to react in the presence of an undoubted infection, except in the case of a strictly limited lesion, as noted above.

The serum of forty-four normal people failed to deviate complement in the presence of gonococcal antigen. The serum of eighteen patients under treatment for syphilis and giving a positive Wassermann reaction was tested; none of these had a history or signs of any gonorrhœa and here also there was no response to the gonococcal test.

The question of how early in the disease the reaction may be demonstrated has not been investigated to any extent in this inquiry. It is not of great importance, for the diagnosis can be more simply made by other means. Even as a test of sensitiveness of the technique employed it is fallacious to inquire how early the reaction may be elicited, as it is acknowledged as a matter of difficulty to say when the infection in the male invades the posterior portion of the urethra. Where the disease is limited to the anterior part of the urethra, it is agreed that the serum usually does not respond; of ten such cases tested only one gave a response and that was feeble. As a rule there has been no response during the first fourteen days. It is of interest to note that a complement fixation test may shed some light on the genesis of an attack in a patient who has previously suffered from the disease. If the attack is a recurrence of a previously latent infection, a reaction is usually found at a very early stage, so that a definite serum response within the first week would at least support the suspicion of relapse.

#### VALUE IN DIAGNOSIS.

The complement fixation test was applied in two hundred and four cases after a diagnosis of clinical cure had been made. In all these cases the standard of cure was as follows: For a period of two months or more there was no discharge or else merely a very slight moisture occasionally in the morning, which on examination revealed nothing inconsistent with normal prostatic secretion; no gonococci or pus cells had been found in the centrifuged morning urine or in the fluid expressed by prostatic massage; there were no threads or flakes in the urine and in thirty-eight patients an examination with the urethroscope was made.

In the series of two hundred and four patients the serum of one hundred and one gave a reaction to the test and that of one hundred and three did not. The tests of the one hundred and three were confirmed by re-tests in nearly all instances. Of the one hundred and one reacting sera forty-four lost the power to fix complement after the lapse of



variable times; in seventeen instances the response to the test remained positive and the patient was afterwards proved clinically or bacteriologically to be still infective. In the remaining forty-six cases no further information was obtained, owing to the patients not being seen again at the clinic. It will thus be seen that in at least 8% (and probably about 15%) the complement fixation test proved more accurate than other methods. It is not contended that the above standard of cure is as rigid as is desirable and, in fact, where the fullest inquiry was instituted (*e.g.*, with sounds, urethroscope and searching physical examination) the clinician could hardly be corrected at all by a serological test. The value of such additional evidence will, however, be apparent.

The question of how long after cure a positive reaction will persist is important. Most observers have found that this period is usually about three months and may be as long as six months. In the present series it has been found that the positive reaction dwindles in intensity more rapidly at first and later more slowly. This falling response invests the final disappearance of the power to react with more significance. A persistent reaction, even if feeble, is of evil omen and is a hint of the need for fuller inquiry.

Investigation was made in fifty-one cases of the time taken for the serum response to disappear, the time at which cure seemed to be complete being ascertained as accurately as possible.

In thirteen patients in whom there was a single acute complication, such as orchitis, the response disappeared in three months. In eighteen in whom these complications could be excluded, the average time was 1.8 months. In fifty-one cases of complicated gonorrhœa, the lesions being subacute or chronic, the average worked out at 3.3 months, the lesions averaging 4.9 months in duration, counting from the first intimation of a complication to the date on which no further evidence was found. As a general rule the more intense the lesion or the longer its duration, the longer does the serum response persist. The most persistent reaction observed in this series lasted for a little over six months, but 75% of these fifty-one patients with chronic infections lost the power of binding complement in three months.

From a series of 159 cases of chronic complicated gonorrhœa in men the following figures were compiled. They institute comparison in cases of proved existing Neisserian infection between the results of examination of the urethral discharge, prostatic secretion expressed by massage and the centrifuged deposit from the morning urine.

It will be seen that the response to the serum test was positive and no gonococci were found in over 42%, while the former was absent and cocci were present in only 5%. Both a reaction and the finding of gonococci were obtained in 50%; in less than 3% the test did not yield a reaction and no cocci were found.

#### Interpretation of Failure to React.

This may be due to the following causes:

- (1) A failure of technique, owing to lack of delicacy in method, in particular to an imperfect antigen.
- (2) A delimited area of disease in a mild infection.
- (3) Failure of the patient to elaborate antibodies due to low powers of resistance.
- (4) A temporary "negative phase," *e.g.*, after vaccines or as the immediate result of sudden exacerbation or metastasis, as noted by Irons,<sup>(13)</sup> or due to imperfectly understood causes, such as, perhaps, an intermittency in the stimulus to or response in antibody production.
- (5) Possibly the establishing of a local tolerance by a chronic infection by an organism of low antigenetic power (as regards the individual patient), with a consequently slight or inappreciable immune response.
- (6) Infection by an organism other than the gonococcus.
- (7) Cure.

A single failure to react is insufficient evidence of freedom from infection, though it may be of value as confirmation. A provocative test, whether it consist of the passage of sounds or prostatic massage or of the injection of a vaccine or the instillation of silver nitrate, will usually evoke a blood reaction also, if such is to be obtained at all. Though the administration of a gonococcal vaccine prolongs the period during which a complement fixation is given and augments the degree of response, a single provocative dose will not produce the reaction in a non-infected or cured patient, but will readily stir up a latent lesion sufficiently to cause the appearance of demonstrable antibodies.

#### Prognostic Value of the Complement Fixation Test.

It has been remarked by Dixon and Priestley<sup>(8)</sup> and others that patients do not do well until the serum reaction is strongly developed. Certainly in the presence of a frank gonococcal complication a strongly positive reaction is a favourable sign, as is also the subsidence of the antibody content of the blood *pari passu* with the routing of the infection.

Result of Test.	Gonococci Found in—			No Gonococci Found in—		
	Urethral Discharge.	Prostatic Secretion.	Morning Urine.	Urethral Discharge.	Prostatic Secretion.	Morning Urine.
Complement Fixation... ..	9	54	17	7	22	38
No Complement Fixation ..	2	6	0	2	1	1



But the conjunction of a clinically severe or intractably chronic gonococcal infection with a feeble serum response is not of good omen. A series of forty-three patients with chronic gonorrhoea, to a large extent cases of prostatitis, was watched for months, during which period they were receiving a routine clinic treatment. Serum tests were made at regular intervals and it was found the response was always feeble, rarely more than "+" or even less. All these cases were of the lingering type of chronic gleet, never showing any acute inflammation, but never clearing up. In some of these a definite focus was discovered on more careful examination and improved or cleared up on more vigorous treatment. In one case the serum test remained feebly positive for over four months after the patient was pronounced cured and without re-infection he was then suddenly attacked by an acute gonococcal poly-arthritis, when the complement fixation became strong.

#### Result of Treatment on the Test.

There does not seem to be any influence exerted by treatment, except in so far as it advances the cure of the patient and except in the case of treatment by vaccines or antisera. Ordinary vaccines exalt the serum response to some extent, detoxicated vaccines more so and antigonococcal serum to a marked extent, though in the latter case the effect is more transient.

#### SUMMARY.

A general account is given of an inquiry into the value of the complement fixation test in gonorrhoea. General concordance is established with the other published work on the subject.

A description is given of the salient points in the technique and stress laid on the need for a sensitive method.

The value of the test is considerable; it confirms the clinical findings and directs the attention of the clinician to those cases worthy of more intensive study or treatment. It sheds light on cases difficult of diagnosis (such as arthritis or chronic inflammations of the *cervix uteri* in women). It helps in forming an estimate of the prognosis and constitutes another and reliable link in the chain of evidence of cure. In the light of the experiences gained during this research I would not feel justified in sanctioning marriage in any patient whose serum fixed complement in the test.

Extensive tables and great detail are omitted for the sake of brevity and numbers of illustrative cases could also be inserted. It is hoped, however, that some help may thus be afforded in interpretation of this test and that further impetus be given to the accurate diagnosis of cure of this frequently neglected disease.

In addition to the acknowledgements made above, I wish to thank the members of the staffs of the Pathological Departments of the Sydney and Royal Prince Alfred Hospitals and also of the Sydney University. To the head of the latter Department, Professor Welsh, in whose laboratory the work was

done, my thanks are especially due for his help and advice.

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## Reports of Cases.

### RECTO-VAGINAL ADENO-MYOMA WITH CHRONIC ENDOMETRITIS.<sup>1</sup>

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On October 4, 1921, Mrs. H.S. consulted me, complaining of menorrhagia for sixteen to eighteen days every month, with intervals.

#### Personal History.

The patient stated that she was forty-four years of age, had had seven children, all living and well, the youngest four years old, was quite healthy till the birth of the last child. Since that time menses had been most irregular and copious, frequently lasting for over two weeks, with intermissions of a day or two, and being accompanied by severe pre-menstrual pain. This disappeared when menses were fully established.

The patient complained of feeling very weak, inability to work, loss of appetite and loss of weight; during the four years she lost twenty-eight kilograms (four stone six pounds). She stated that she rested continually during the period of hæmorrhage and took all food cold, for if she took anything hot, the bleeding became more severe.

#### Family History.

Both parents of the patient were still living and healthy; her sisters and brother also were in good health.

#### Condition on Examination.

The skin of the face and other parts of the body and the mucous membranes were pale and the patient was in a cachectic condition. There was slight twitching of the left side of the face; involuntary movement of the upper extremities was not pronounced.

Moderate palpitation of the heart, with a systolic murmur resembling that of idiopathic anæmia, was noted.

The vaginal canal was much congested and lacerated, particularly the posterior wall, with sloughing of the squamous epithelium; there was an abnormal discharge of an ichorous nature and very offensive. When the finger was passed high up the canal a diffuse, nodular thickening could be felt behind the cervix, which was slightly tender on pressure, probably due to the morbid condition of the vagina.

An irregular mass protruding in the lumen of the bowel was detected on rectal examination. No pain was complained of during this manipulation.

#### Diagnosis.

A diagnosis of recto-vaginal adeno-myoma with chronic endometritis was made.

The patient refused operation or hospital treatment, but wished to be treated privately. I therefore decided to try to improve her general condition and the morbid state of the vagina.

#### General Treatment.

Intermuscular injections of iron, arsenic and strychnine were given. During the first week one ampoule containing 0.06 gramme of iron arsenite and 0.1 gramme of strychnine nitrate was injected each day. During the second week two injections were given daily, during the third week one injection was given daily and during the fourth week one injection was given every second day.

A tablespoonful of malt extract with hæmoglobin was ordered three to four times daily for several months.

The twitching of the face and the irregular movements of the arms ceased after the first week's treatment.

The action of the bowels was regulated with decoction of senna pods taken at night time.

#### Local Treatment.

Vaginal tampons of "Aristol," iodoform and olive oil were inserted for two weeks once in twenty-four hours; also vaginal douches with sterile hot water at 40° C. (115° F.). During this treatment the patient was free from hæmorrhage for twenty-seven days, gained over three kilograms in weight and her colour and general condition improved. The mass became smaller.

Unfortunately, the patient had to return home, a distance of one hundred and twenty miles. I instructed her to continue douching with chinosol and taking the malt. After four weeks her menses came on and, lasting eight days, she decided to return to Adelaide for further treatment. She was looking well and had gained more weight. Her general condition was very satisfactory.

I could not detect enlargement in the recto-vaginal septum, but only traces of the old lacerations, and there was a discharge more or less of a fetid nature. She again refused to submit to operation, though I told her that on this occasion the operation would be small. However, she asked for a consultation with Dr. Marten and, after being examined by him, consented to undergo an operation.

After a thorough curettage with blunt curettes I swabbed the uterus with aseptic cotton wool, but did not flush it. Dr. Marten was present at the operation. The vagina was plugged with iodoform gauze for twenty-four hours. Five days later there was hæmorrhage from the uterus for thirty hours. This I attribute to the use of *gossypium* unprotected by gauze when the uterus was being swabbed.

I have seen the patient twice since. Her menses have been regular for four or five months; for the last four months there has been amenorrhœa, with characteristic symptoms of pregnancy.

A few days ago I received a letter from Mrs. H.S., giving a very satisfactory report of herself.

## Reviews.

### THE TECHNIQUE OF RADIOSCOPY.

DR. J. A. METZGER'S book, "Principles and Practice of X-Ray Technic for Diagnosis," is intended for students and practitioners engaged in radiographic practice.<sup>1</sup> The author first considers apparatus and laboratory arrangements and deals with the various factors necessary to the production of a skiagram. Consideration is also given to the dangers to the patient and operator and to methods necessary to avoid these dangers.

The various standard positions are well illustrated and described. In a table the distance, diaphragm, gap, kilovoltage, milliamperage and time of exposure are set out in detail. The technique described varies for the different regions and is rather cumbersome when compared with the more modern method of varying the penetration factor only. We doubt whether the exposures recommended for alimentary work would give sufficiently exposed films.

The chapter on localization describes Sweet's old method. A description of the improved method would be advisable in a modern work.

In the chapter on dark-room technique, the author states that the tank method has proved a failure. Such a statement is rather an admission that the technique of exposure is faulty, as a properly exposed negative of any part should develop in a given time.

The book is loosely written and in parts is "slangy" and stereoscopic plates are referred to as "stereoscopes," while in many cases the abnormal conditions are "diagnosed."

The illustrations of the various positions are most valuable and constitute the best part of this work.

<sup>1</sup> Read at a meeting of the South Australian Branch of the British Medical Association on September 28, 1922.

<sup>1</sup> "Principles and Practice of X-Ray Technic for Diagnosis," by John A. Metzger, M.D.; 1922. St. Louis: The C. V. Mosby Company; Royal 8vo., pp. 144, with 61 illustrations. Price: \$2.75.

## The Medical Journal of Australia

SATURDAY, DECEMBER 2, 1922.

### Combating Venereal Disease.

THE importance of venereal disease as a cause of invalidity and death is so great that no apology is needed when this subject is discussed for a second time within a few weeks. On the former occasion the statement was made that there was no guarantee that the notification figures revealed the actual incidence of these infections. A correspondent has designated the notification figures grotesque. While all students of hygiene will agree that the incidence of syphilis, gonorrhœa and chancroid in any so-called civilized country is considerably higher than 0.4% *per annum*, it would seem that there is a distinct advantage attaching to notification, even if incomplete. In Australia the experiment is being made of controlling these infections by compulsory notification and compulsory treatment. In Great Britain the legislature has not adopted these measures. They were held to be very far-reaching and "wholly impracticable until efficient, well-organized and sympathetic treatment is completely available and until and unless public opinion is generally in favour of such action." The principles laid down for the combating of venereal disease by the Royal Commission of 1916 include the provision of facilities for early treatment for all persons suffering from these diseases, the extension of facilities for diagnosis, the prohibition of advertisements of remedies and of treatment by unqualified persons and the organization by local authorities of treatment centres where attendance is given free of cost. It will at once be apparent that a comparison might be drawn between the results obtained in Australia and those obtained in England and Wales, if sufficiently reliable data could be collected and if there were reasonable uniformity among the several States of Australia. In his annual report for the year 1921, Sir George Newman, the Chief Medical Officer of the Ministry of Health, publishes some interest-

ing information and voices some expressions of opinion. The statement has been made that it had become part of the English scheme to establish ablution centres and to rely to some extent on prophylactic measures applied after exposure to infection. In an earlier annual report Sir George Newman referred to the establishment of a few of these centres or depôts in connexion with military communities. Not one word is devoted to this subject in the current report and it is evident from the manner in which Sir George Newman deals with his subject, that this form of prophylaxis has no place in the English scheme.

The machinery employed in England and Wales is relatively simple. No less than one hundred and ninety-four treatment centres have been established. Reliance is attached to the result of rendering persons with syphilis or gonorrhœa non-infectious at an early stage as a measure of prevention. The centres are staffed by approved medical officers. Indoor accommodation for patients of both sexes has been provided at hospitals with venereal diseases clinics. In addition, fifteen hostels have been opened for women and girls suffering from these diseases. Lastly, there are nine establishments for the reception of pregnant women suffering from venereal disease either for confinement or for ante-natal treatment. The scheme includes the maintenance of laboratories at the public expense where the examination of specimens is undertaken for medical practitioners and for the medical officers of the treatment centres. Arseno-benzol drugs are provided free of cost to medical practitioners who can produce evidence that they are competent to use them.

Sir George Newman calls attention to the fact that the number of persons attending at the treatment centres depends to a large extent on the personality, capacity and experience of the medical officer in charge. He has reason to believe that an efficient and enthusiastic medical officer is able to keep his patients under control for a longer period than a less competent practitioner. Unfortunately, some of the medical officers of the treatment centres have not worked in collaboration with the medical officers of health, with the result that the prophylactic aspect of the problem has been neglected.

In spite of the fact that the scheme is based on a



system of voluntary attendance, it would seem that the local authorities, whose duty it is to institute the various measures, have achieved a not inconsiderable amount of success. Sir George Newman asserts that these centres and clinic are proving to be places of enlightenment and education in regard to the gravity of these diseases and the importance of their prompt and effective treatment. The Ministry has laid down a rigorous standard of cure and he claims that a substantial proportion of the patients with syphilis have become cured. The opinion is widely held that the amount of venereal disease has been diminished as a result of the treatment of patients at the centres. This is, of course, only an impression. The incidence of syphilis and of gonorrhœa in England and Wales is unknown, but the statement commands attention in view of its prevalence and in view of the fact that the persons expressing this opinion are men of experience who have facilities for forming a judgement. The number of persons treated during the past three years for syphilis, gonorrhœa and soft sore represents approximately two in each thousand of population *per annum*. The patients with syphilis are slightly more numerous than those with gonorrhœa. It thus appears that the compulsory system results in the treatment of twice as many infected persons as the voluntary system. In the absence of exact information it is not unreasonable to assume that the incidence of venereal diseases is not higher in Australia than it is in England and Wales. Surely the notification and treatment of about four persons in each thousand of population in Victoria and Western Australia must be accepted as evidence of a reasonable degree of success of our experimental legislation. It is claimed by Sir George Newman that the efficient treatment of about 80,000 persons infected with syphilis, gonorrhœa or chancroid in a population of nearly 38,000,000 has had the effect of reducing the number of fresh infections to a noticeable extent. The treatment of nearly seven thousand infected persons in a community numbering one and a half millions should have a still greater effect in reducing the spread of infection. In England and Wales the treatment is to a large extent in the hands of specially trained medical practitioners. Moreover, general practitioners are

invited to attend at the treatment centres and clinics for the purpose of studying the methods adopted in the treatment. In Australia relatively little treatment is given at clinics. In England and Wales there are one hundred and ninety-four centres or clinics. In proportion to its population Australia should have twenty-nine. In England and Wales no less than three hundred and eighty-four practitioners are acting as approved medical officers for venereal diseases centres or clinics. In England and Wales no less than one hundred and fifty-one voluntary hospitals have clinics for the treatment of venereal diseases. In Australia we have barely a dozen.

The Australian experiment is worthy of extended trial, but the authorities should take to heart the two prominent lessons of Sir George Newman's report. The first is that notification of all infections and compulsory powers of treatment are wholly impracticable until efficient, well-organized and sympathetic treatment is available. The second is that success is directly proportionate to the expertness of the medical officers in charge of the treatment centres and of the laboratories at which important aid to diagnosis is rendered.

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#### SPIRITUAL HEALING.

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THE question of spiritual healing has recently been brought into prominence in South Africa. Mr. J. M. Hickson, sometime President of the Society of Emanuel in Great Britain, is making a tour of the world as a missionary of spiritual healing under the ægis of the Church of England. He is shortly to arrive in Australia. Already much work is being done in "preparation" for his visit, which will include all the cities and most of the larger towns. The *modus operandi* consists in the holding of a church service with prayer and address, followed by the "laying on of hands" by the missionary on all the sick who have congregated for that purpose. This is no new departure. Its counterpart has been seen in many and varied forms. In view of the fact that medical practitioners have in the past and may again be asked to cooperate or lend approval to this procedure, it is well that certain facts should be made known.



In 1909 the Metropolitan Counties Branch of the British Medical Association brought the matter of spiritual healing under the notice of the Council. They thought that the question was of sufficient importance to the profession to merit careful consideration. A sub-committee was appointed to investigate and report on the whole subject. It included general practitioners, physicians, neurologists and alienists. At first the members of the sub-committee were at a loss to understand what meaning was attached to the term spiritual healing by those who used it. A letter was accordingly sent to several prominent churchmen, asking their help in clearing up the confusion that existed in connexion with the terms "spiritual healing," "faith healing" and "psychic healing." These gentlemen included such prominent divines as the Archbishop of Canterbury, the Bishop of Winchester, the Dean of Westminster, the Reverend Percy Dearmer and others. Many of those approached seem to have experienced considerable difficulty in defining the term, but one and all gave evidence of a general desire for guidance on the technical side of the question. The Bishop of Winchester, in the course of his reply, stated that he was inclined to place all alleged spiritual, psychic, mental and faith healings in one category, that of an influence of a mind or will over another person's mind or will reacting forcefully on the latter person's physical condition. He saw no distinction generically between the healings alleged on behalf of the Christian scientists, Mr. Hickson, faith healers or the shrine at Lourdes. Further, he saw no reason to accept the view that gifts of healing were the prerogative of the clergy as such.

The members of the sub-committee examined patients brought forward by Mr. Hickson. The conclusion arrived at was that the essential factor in the cures that had been wrought was suggestion. No evidence was forthcoming of any authenticated cure of organic disease. The sub-committee was satisfied that the ministrations of the spiritual healer, as of any person skilfully using suggestion in its various forms, might cure functional disease and alleviate pain in organic disease.

It is a common saying that the days of miracles are past. A miracle may be defined as a phenomenon

that occurs contrary to the known laws of Nature. It must, of course, be admitted that it is possible that all the laws of Nature have not been discovered. The fact remains, however, that no instance has been recorded in which an organic disease, proved by pathological examination to exist, has been cured by suggestion. No practitioner of medicine will deny that suggestion is a very powerful agent in the treatment of disease, particularly of a functional character. Every practitioner uses it when he gives a hopeful prognosis with the object of cheering a patient stricken with a dire disease. That certain cooperation is sometimes desirable between physician and priest is equally obvious and the former will be glad to invoke the aid of the latter when his ministrations can be helpful. The physician, however, is the person responsible for the treatment of disease. He has been trained to that end. Diagnosis and treatment, whether by the knife, by physic or by suggestion, can be safely left in his hands. There is a distinct danger that in the hands of untrained persons irreparable harm may be done to the patient. The danger of delay in seeking medical aid is no small one and the present "preparations" for Mr. Hickson's visit to Australia are in this regard potentially dangerous.

#### THE PATHOLOGY OF OSTEITIS DEFORMANS.

In 1876 Paget reported five instances of a "chronic inflammation of bone" which he named *osteitis deformans*. Since that date many cases of the disease have been reported and many efforts have been made to discover the underlying cause of the condition. In 1913 Hurwitz reported six cases and discussed the histories of the patients in some detail.

The first of these patients has recently died and Dr. Sydney M. Cone has studied the *post mortem* appearance of the bones, tissues and organs.<sup>1</sup> At the time of reporting in 1913 the patient was seventy-seven years of age. His family history contained nothing of importance. He had suffered from whooping cough, measles, mumps and scarlet fever in childhood. He developed malaria in adolescence and suffered from repeated attacks of ague. At thirty-five he had cerebro-spinal meningitis. By occupation he was a tailor. He enjoyed excellent health until he was fifty years of age. At this time he began to suffer from intermittent pains in the right shoulder and right hip. His height at this period was one hundred and seventy centimetres (five feet eight inches). At sixty-two years of age he began

<sup>1</sup> *The Journal of Bone and Joint Surgery*, October, 1922.

to notice that he stooped a little and that his legs were becoming bowed. When admitted to hospital in 1913 his height was one hundred and fifty centimetres (five feet two inches). His waist measurement, which had previously been sixty centimetres (twenty-four inches), was eighty-five centimetres (thirty-four inches). His mental condition was unimpaired. He presented the characteristic appearance associated with the disease, namely, a flattened, kyphotic chest, broad, feminine type of pelvis, large calvarium and bowing of the femora, tibiae, radii and ulnae. Examination of the patient showed the presence of numerous subcutaneous lipomata. No thyroid gland could be palpated. Slight pulmonary emphysema was present. The area of cardiac dullness was not increased; the sound at the aortic area was accentuated. Definite arterio-sclerosis was present and the systolic blood pressure averaged one hundred and forty millimetres of mercury. The blood picture was normal and the serum failed to produce a reaction when subjected to the Wassermann test. Urinary and faecal examinations failed to reveal any abnormalities. The skull was seen by X-ray examination to have attained a thickness of 2.5 centimetres (one inch) by deposit of new bone. The *sella turcica*, though irregularly shaped, was present. Many of the bones showed the presence of osteo-porosis.

The pathological changes found in the various parts of the body at *post mortem* examination by Dr. Cone are full of interest. All the organs were found to be the seat of arterio-sclerotic changes, the *tunica media* being generally involved. The aorta was covered with atheromatous plaques. The vessels of the heart were not extensively involved. The kidneys showed irregular arterio-sclerosis, with some parenchymatous degeneration in the tubules. The spleen showed passive congestion and chronic inflammatory changes. The supra-renal glands were also the seat of chronic changes with some calcification in the walls of its vessels. In lymphatic glands the fibrous changes were so extensive that the normal structure of the gland could not be identified.

Dr. Cone draws attention to the unusual combination of vascular degeneration with muscular and epithelial proliferation. Strangely enough, he makes no mention of the thyroid gland. Hurwitz noticed that it was not palpable in 1913. The point is important, for some observers endeavour to incriminate the thyroid in the aetiology. The calvarium and the hypophysis unfortunately could not be included in the *post mortem* examination. The bone changes varied apparently according to the static and vascular conditions. Generally degeneration was out of all proportion to that seen in other parts of the body. All the bones could be cut with a scalpel. Erratic formation of bone was present and bone absorption was going on by lacunar absorption and by fluids. New formation of bone had ceased for the greater part. A few new osteoid deposits were found covering the Howship's lacunae and lining trabeculae of older bone. There was no evidence of new bone formed from the periosteum. One of the most characteristic features was the new formation and disappearance of new bone. Such bone was granular with widened

lacunae and multiplying bone cells in the bone lining the canals. No normal marrow space was seen. In the vertebrae there was evidence of complete cutting off of nutrition by thrombosis. It will be seen that the *post mortem* appearances found by Dr. Cone are essentially the same as those described by other observers, such as Paget, Butlin, von Recklinghausen, Steele and Kirkbridge, Stilling, Higbee and Ellis and many others. Elting stated that the differences in the anatomical descriptions of various observers might be accounted for by the fact that the disease was studied at different stages.

Paget regarded the process as being primarily an inflammation resulting in the absorption of bone and the formation of lacunae. This view was in accord with the microscopical findings of Butlin. Stilling held that the disease was due to a process similar to rarefying osteitis starting beneath the periosteum and gradually affecting the more central portions of the bone. In addition to this, a new formation of bone occurred, beginning partly in the marrow and partly under the periosteum. In the case under discussion Dr. Cone could find no evidence of the formation of new bone sub-periosteally, though he very correctly points out that this may have occurred in the early stages of the disease. Lancereaux regarded the bone formation as being merely a reparative process. Von Recklinghausen, however, opposed this view and laid stress on the fact that the new formation does not occur on the side of the concavity. He held that thickening of bone could be demonstrated in the early stages of the disease. He also drew attention to the frequent accompaniment of giant cell tumours and sarcomatous masses in bone affected by *osteitis deformans*. Dr. Cone quotes von Recklinghausen and Stilling, who maintained that static, thermal and vascular conditions are responsible for the localization of the bone involvement and adds that in his opinion the blood vessels are the source of the disease *in toto*. He thinks it should be brought in "closer parallel" to the general pathological processes that accompany chronic passive congestion. He points out that the over-filled vessels with leakage and oedema are followed by cardio-vascular compensation. He states that in all cases of chronic passive congestion some of the changes found in *osteitis deformans* are present. The cellular changes in the marrow described by many observers are held by him to be found whenever there is excessive fluid bathing the trabeculae, whether due to vascular or fluid change. It will thus be seen that there is considerable divergence of opinion in regard to the initial step of the disease process. All observers, however, describe a similar microscopical picture, that of a resorption of bone associated with the excessive production of a poorly calcified bone.

Turning to the aetiology, it must be acknowledged that, if multiplicity of theory is any criterion and it generally is, *osteitis deformans* is a disease for which no satisfactory explanation has yet been found. Almost every conceivable cause has at one time or another been assigned to it. Heredity, rheumatism and trauma have been in turn suggested as causative factors. While it might seem that one of these factors has been operative in certain in-

stances, other cases are numerous in which no such cause can be assigned. In these instances the association is probably accidental. Hereditary syphilis has been held by many to account for the condition. Fournier was among those who claimed that this was so. This, however, has not been substantiated. Dr. Cone evidently favours syphilis, hereditary or acquired, for he states that his impression is that the primary blood vessel pathology resembles that met with in syphilis with accompanying bone changes met with in chronic passive congestion. In view of the well-known bony changes met with in acromegaly, it is not surprising that the hypophysis has been examined critically in this regard. Bartlett was probably alone in describing microscopical changes in the pituitary gland in a patient suffering from *osteitis deformans*. The thyroid gland has been examined by many observers and by only a few, amongst them Higbee and Ellis, Hudelo and Heitz, Levi and Askanazy, have abnormalities been described in its structure. Reference has been made to the association of tumour growths with *osteitis deformans*. That this association is anything more than a coincidence is unlikely. Higbee and Ellis discussed the causation very fully and formed the not unreasonable conclusion that accurate studies of the metabolism of patients, followed by histological examination of the tissues, would probably be the most hopeful means of solving the problem. From an examination of the literature on the subject it would appear that this has not been done.

#### HYPO-PITUITARISM.

SINCE Fröhlich in 1901 described a condition of hypo-pituitarism known as *dystrophia adiposo-genitalis*, the interest of investigators has been sustained in what was up to that time an unexplored field. This condition is generally characterized by obesity, a hypoplastic condition of the sex organs and retarded growth or infantilism. Crowe, Cushing and Homans produced these signs experimentally by the removal of portion of the hypophysis. Histological changes were discovered in the thyroid gland in persons manifesting these signs. It is well known that the activities of these two glands are bound together in an exceedingly intimate fashion. This was first recognized in 1889, when Rogowitsch found that extirpation of the thyroid gland led to hypertrophy of the hypophysis. It has also been shown that early removal of the anterior lobe of the hypophysis results in a failure of development on the part of the thyroid gland. Many different degrees of hypo-pituitarism may exist and the success which attends the administration of thyroid gland extract, is further evidence of the inter-relationship of the activities of these glands.

Some interesting experimental work has recently been done on the thyroid and pituitary glands of tadpoles by Drs. Philip E. and Irene P. Smith.<sup>1</sup> These observers selected tadpoles for their purpose, for they point out that the tadpole, unlike mammals,

can survive the loss not only of the anterior portion of the hypophysis, but also of the other portions of the gland. In tadpoles the thyroid gland, after removal of the hypophysis, was found to have an atrophic appearance. This has been shown to be due to a developmental fault rather than to actual regressive changes. Attempts were made to repair the damage to the thyroid gland by administering bovine hypophyseal substance. This was done by two methods—by feeding and by injection. In none of the tadpoles to which all three portions of the hypophysis were fed, was any regeneration of the thyroid noted. They all failed to metamorphose and the thyroid on microscopical examination presented the typical appearance found in the case of hypophysectomized control tadpoles which were supplied with a diet of muscle and lettuce. A series of tadpoles was treated by intraperitoneal injections. Doses were given three times a week, starting with 0.003 cubic centimetre and gradually increasing till 0.02 cubic centimetre was given at the end of the experiment. The fluid injected was prepared by separating the lobes after washing and sterilizing with 60% alcohol. The material was then ground, diluted with a small quantity of saline solution and centrifugalized. The turbid upper layer was used for injection. As a control injections of fresh muscle prepared in a similar manner were used. The injections of muscle generally caused a toxic effect which disappeared after a few doses had been given. In the case of the controls no response was discovered in the thyroid gland. Neither the posterior lobe nor the *pars intermedia* provoked any response in the thyroid. In those tadpoles treated with the anterior hypophyseal lobe the reaction on the part of the thyroid was most noticeable. When a small quantity was injected, a thyroid gland was found which could not be distinguished in any way from that of a normal animal. When larger injections were given, a picture of extreme hyperplasia was produced. In addition to this thyroid gland change, the initiation of metamorphosis occurred and the process was carried on and completed in a normal manner. Drs. P. E. and I. P. Smith conclude that injection makes available to the tadpole some substance that is either broken down during digestion or which is unassimilable. Normal tadpoles were injected with anterior lobe and it was found that the thyroid glands of these animals did not display an increased activity as compared to their uninjected normal controls. These observers endeavour to prove by analogy that the anterior lobe of the hypophysis brought the thyroid gland into action and in order to show that the anterior pituitary lobe alone could not be the determining cause, they record experiments of injection of thyreoidectomized tadpoles. Metamorphosis could not be produced by this means.

In discussing their results they hold that the indications are that successful treatment of hypo-pituitarism in human beings depends on securing an extract of the anterior lobe which can be injected parenterally. The subject as put forward by these observers is extremely interesting. Time will probably show whether their conclusions are correct or not.

<sup>1</sup> The Journal of Medical Research, June-July, 1922.



## Abstracts from Current Medical Literature.

### PATHOLOGY.

#### Megalocaryocytic Reaction to Saponin Poisoning.

J. FIRKET AND E. S. CAMPOS (*Bulletin of the Johns Hopkins Hospital*, August, 1922) have investigated the effects produced in rabbits by the intravenous injection of saponin. Their interest in the subject was aroused by the occurrence of a peculiar case of extreme anaemia in man which was characterized by complete aplasia of the bone marrow, together with a new formation in the liver and spleen of myeloid tissue in which megalocaryocytes predominated. They found that a similar condition could be produced in rabbits by saponin poisoning. Bunting had previously shown that saponin poisoning destroys many of the blood platelets and produces a multiplication of the megalocaryocytes in the bone marrow. The authors found that single or repeated intravenous injections of saponin in rabbits do not change the resistance of the red blood cells to this toxic substance. The erythrocytes of splenectomized rabbits are more resistant to hypotonic salt solution than are the erythrocytes of normal rabbits. There is no difference in their resistance to saponin. In addition to its hemolytic action, saponin is a highly destructive agent for blood platelets, both *in vivo* and *in vitro*. The intravenous injection of saponin into rabbits produces in the bone marrow hyperplasia and, simultaneously, numerous diffuse or circumscribed foci of hemorrhage. In none of the animals used was there found any sign of aplasia of the bone marrow. As the function of the bone marrow becomes impaired by hemorrhages and their effects, the spleen, liver and other organs show a vicarious myeloid formation. The myeloid metaplasia taking place outside of the bone marrow is a reaction to the loss of blood platelets and red cells which are the elements destroyed. Megalocaryocytes and normoblasts are proportionately the most numerous elements of that myeloplastic tissue. There are some myelocytes, but their number is conspicuously low. The authors state that they agree with most hematologists in Europe and America and with Wright that blood platelets are of megalocaryocytic origin. A similar megalocaryocytic reaction was observed in the lymph glands after intravenous injection of saponin in splenectomized but not in non-splenectomized rabbits. This may be explained as a vicarious function. The megalocaryocytes found in the bone marrow, spleen, liver and other organs of the rabbits injected with saponin, are not all identical in appearance. While presenting differences in morphology and structure of the nuclei and cytoplasm, they may represent different developmental stages of the same type of cell.

#### Chordoma.

M. J. STEWART (*Journal of Pathology and Bacteriology*, January, 1922) reports a case of malignant sacrococcygeal chordoma and gives a complete account of the literature concerning this interesting and rare type of neoplasm. The commonest position for chordoma is the *clivus Blumenbachii* and next to that the sacrococcygeal region; only very rarely are they met with elsewhere. Virchow (1857) gave the first good description of these growths. He thought, however, that he was dealing with cartilaginous formations, with softening of the fundamental substance and vesicular degeneration of the cells. It has now been established that these growths are composed of notochord-like tissue and undergo similar evolutionary changes. The salient histological features on which a diagnosis is based are: (i.) The distinctly alveolar nature of the growth; (ii.) the constant tendency of the cells from a very early stage in their development to accumulate increasing quantities of mucin in their cytoplasm; (iii.) the frequent formation of typical "physaliphorous" cells, owing to ballooning out of the cytoplasm by the large amount of mucin present; (iv.) the final escape of the mucin into the intercellular spaces, with consequent shrinkage of the tumour cells and their separation into small, narrow strands and bundles. In the author's specimen the histological characters of the more cellular areas are such as to warrant the use of the term chordo-carcinoma and this is the most common type of malignant change found in these growths. In the earlier communications on chordoma the majority of the authors dealt with small, flattened, jelly-like nodules occurring along the course of the basilar artery and arising from notochordal rests in the neighbourhood of the spheno-occipital synchondrosis. Both simple and malignant forms of chordoma occur, the latter being much the more common. Even the malignant varieties are usually of slow growth and long continued course, especially those occurring in the sacro-coccygeal region. They tend to recur after removal and cause death chiefly by their local effects, dissemination being quite exceptional. Intracranial clivus tumours, by virtue of their position, are much more serious than sacrococcygeal, their average duration, from the first onset of symptoms, being about two years, as compared with nine years in the latter group.

#### Suppurative Cholangitis.

A. DAVID (*Journal des Sciences Médicales de Lille*, December 4, 1921) reports a fatal case of suppurative cholangitis in a male patient twenty years of age. The patient was admitted to hospital with a diagnosis of appendicitis. He had acute pain over McBurney's point and localized muscular rigidity in this region. His temperature was 38° C. and there was a history of nausea and vomiting. On the following day the clinical picture

altered considerably, the abdomen was soft and tenderness had disappeared. Subsequently the patient experienced rigors, the temperature rose to 41° C. and the conjunctiva became slightly jaundiced. Later jaundice became marked and was accompanied by epistaxis and the presence of bile in the urine. The parasites of malaria and spirochætal jaundice were searched for, but in vain. Only a partial autopsy was permitted and this revealed a large, soft, spongy liver containing many abscesses of different types. The bile channels, which were filled with a greenish, purulent liquid, in places showed unbroken dilatations, while elsewhere small pockets burrowed into the hepatic parenchyma some distance from the bile ducts. The appendix was not examined. The exact diagnosis of this case was difficult. Although jaundice was not apparent and fever constituted the only evidence of disease, malaria seemed to be the most likely aetiological factor, but when jaundice became manifest, attention was immediately directed to the liver. The repeated rises in temperature strongly indicated infection of the biliary channels—the so-called *fièvre bilio-septique* of Chauffard. A noteworthy feature was that the stools were coloured and that it was not a question of obstruction of bile ducts. It is well known that the majority of cases of cholangitis are due to some previous infection, such as enteric fever, pneumonia, streptococcal infection (erysipelas, puerperal fever), etc., but in the case under discussion it might well be asked if the appendicitis present at the outset did not play a part in these suppurative lesions in the bile channels. This hypothesis assumes a special importance on reference to the works of Dieulafoy and his pupils on *le foie appendiculaire*. This author has thrown light on the following fact. After a sharp attack of appendicitis the pathogenic organisms are capable of passing into the appendicular veins, of infecting and partly thrombosing them and of spreading thence by way of the portal vein to the liver, where they multiply with alarming rapidity. Such cases are fortunately rare. They are, however, worthy of consideration.

#### The Tetanus Bacillus as an Intestinal Saprophyte.

CARL TENBROECK AND J. H. BAUER (*Journal of Experimental Medicine*, September 1, 1922) found tetanus bacilli in 34.7% of stools from seventy-eight individuals in Peking. To detect the tetanus bacilli they cultured the suspected material, isolated the tetanus-like organisms and demonstrated that the pure cultures formed a spasm-producing toxin neutralized by tetanus antitoxin. The authors state that the tetanus bacillus was growing in the alimentary tract, for it was present in the faeces of individuals who had been on a practically sterile diet for a month or more. They also state that one individual may eliminate several million spores of tetanus bacilli in a single stool.



## PÆDIATRICS.

## The Use of Radiant Heat.

H. J. GERSTENBERGER AND C. T. J. DODGE (*American Journal of Diseases of Children*, October, 1922) point out that the great value of quartz mercury arc ultra-violet rays as a therapeutic measure in various diseases, but especially in rickets, tetany and in certain forms of tuberculosis, has been established beyond question. Heat rays are now employed in otology. A small six hundred candle-power, white glass "Sollux" is used, practically similar to the higher Watt white glass nitrogen bulbs made in the United States of America. In the "Sollux" outfit the rays are projected forward and concentrated without causing a burn by the use of a parabolical concave reflector made of aluminium. A series of patients suffering from chronic suppurative *otitis media* were treated at the Babies Hospital, Cleveland, by radiant heat. The mothers brought the patients and sat beside the table to hold them steady. The plan of treatment consisted first of all in the cleansing of the external canal. Exposure of the ear to the light for one hour was then made at a distance of ten centimetres. The children were placed on a table with the ear uppermost. Dark glasses were applied, or the mother held a small towel over the face in front of the ear and in this manner protected the patient's eyes. Cleansing the external auditory meatus with hydrogen peroxide was undertaken at home three times daily. The children returned for exposure to light once a day if circumstances permitted. All patients of this series had suffered from discharging ears for a period of at least four weeks. The results of treatment showed that local and general discomfort was removed in most cases after the first exposure. Practically all the patients showed not only a cessation of the discharge, but also a complete healing of the drum membrane. Exposures averaged 8.7 in number, varying from two to fourteen. The authors conclude that radiant heat in the form of light is unquestionably a therapeutic measure of great value and that it will be found useful not only in the treatment of *otitis media*, but also in other conditions in which the therapeutic effectiveness of an acute hyperæmia is desired.

## Experimental Sensitization.

ARTHUR LATHAM (*The Practitioner*, August, 1922), writing on experimental sensitization, states that if an animal be injected with a dose of some foreign protein and a sufficient incubation period of several days elapse, it is found that a second injection of the same protein will cause profound symptoms which may even lead to the death of the animal in a few minutes. The foreign protein used may be of a harmless and non-toxic nature, such as white of egg, normal horse serum, etc.. The reaction is unquestionably a specific one. That is to say, if the albumin of a hen's egg be used for the first sensi-

tizing dose, exactly similar albumin must be used for the second exciting dose or no anaphylaxis will result. The symptoms vary in the different species of animal. In rabbits they are chiefly cardiac, in guinea-pigs bronchial, in dogs gastro-intestinal and so on. Human beings react in a similar way soon after exposure to the article, food or otherwise to which they are sensitive. Their eyes will run and asthma will develop, sickness and diarrhoea follow, often accompanied by headache and urticarial rash. Although much new light has been thrown on asthma by its recognition as a symptom of an anaphylactic nature, yet many observations upon the causation of asthma were previously well known. Susceptibilities and idiosyncrasies to various foods or animals have long been recognized. An important factor in the induction of sensitization is the taking of a considerable quantity of a protein for a short time, followed by a period without it. As an example, a child was fed by his mother for seven months, except for forty-eight hours, when the mother was taken ill and he was given cows' milk successfully. On weaning later on he could not take cows' milk; he vomited and had nettle-rash. Goats' milk, however, caused no symptoms. Occasionally he was given cows' milk with resulting attacks of asthma. At eight years old he gave a definite skin reaction to lactalbumin. Since he gave up cows' milk he has been free from asthma. The short injection of an article which is not part of the ordinary diet, explains the common idiosyncrasy so many people have to strawberries, lobsters, honey, etc., perhaps also to lampreys in the celebrated case of King Henry. In many instances the causation of hay fever is exactly similar. A child may take a long day in the country, get covered with pollen and return to town to be sensitized by next year. A change from the country to the seaside may therefore effect a cure and *vice versa*, depending on the prevalence of the protein involved. It is established that sensitization to foreign proteins can be very accurately discovered by means of the skin tests. This valuable information leads often to the immediate cure of asthma by the avoidance of the sensitizing protein on the part of the patient or by his being desensitized to it.

## Tuberculosis in Infancy and Childhood.

ROWLAND G. FREEMAN (*Archives of Pediatrics*, August, 1922) discusses the portals of entry of tuberculosis in infancy and childhood. He finds that in the intestine and the cervical lymphatic glands the infection is particularly apt to be of bovine origin. Milk, which is a frequent carrier of bovine tubercle bacilli, is still used either raw or commercially pasteurized, on the erroneous assumption that it is comparatively clean and free from harmful bacteria. No matter what the portal of entry, the bacilli soon lodge in the bronchial lymphatic glands and from there rapidly spread to the lungs, liver, spleen, kidney and meninges.

The prognosis in the first year after the involvement of the lung is absolutely bad. On the other hand, infection of the cervical lymphatic glands may be overcome by operative measures. Pulmonary tuberculosis is usually so acute a disease in the first year of life that the patients are rarely emaciated at the time of death. If an infant with a chronic lung condition becomes emaciated the probability is that the condition is not tuberculous. Enlarged bronchial lymphatic glands may be shown by a skiagram if the picture is taken at a lateral oblique angle instead of in the antero-posterior direction. Tuberculosis of the lungs in children over one or two years of age may be cured in many cases if prompt action is taken. Fresh air should be used persistently and heliotherapy cautiously, while rest, full, nourishing, well-balanced diet and cod liver oil are important. Temperature falls and weight rises, while the physical signs and the X-ray pictures gradually show improvement in those destined to recover.

## Postural or Orthostatic Albuminuria.

F. PARKES WEBER (*The British Journal of Children's Diseases*, June, 1922) is convinced that in uncomplicated cases of orthostatic albuminuria occurring in apparently healthy adolescents the life may be regarded as a normal one from the insurance point of view. The condition is often associated with the tall, "lanky" build of body suggestive of visceroptosis—the so-called *morbus asthenicus*—in which there is often some degree of lordosis likewise present. It is a well-known fact that in chronic passive congestion of the kidney from various causes the urine often contains albumin and few or many tube-casts. The conclusion is that, when lordosis is present, passive venous congestion results from the left renal vein being compressed between the abdominal aorta and the mesenteric artery. In such an instance the aorta is pushed forward by the lordosis or the mesenteric artery is stretched by ptosis of the mesocolon. Lordosis is not by any means the only ætiological factor. There must be individual predisposition of some kind and the age incidence must not be lost sight of. The author has no record of a bad result due to the albuminuria of the true orthostatic type.

## Powdered Protein-Milk.

L. W. SAUER (*Archives of Pediatrics*, January, 1922) says that, owing to the difficulty of preparation, instability and variation of the finished product, the original protein-milk has not been universally adopted. The following summarizes his view: (i.) *Elweissmilch* is difficult to prepare, preserve and give as a food. (ii.) Powdered protein-milk diluted with water and enriched with carbohydrate is very efficacious as a prophylactic or complementary food for very young infants. (iii.) Powdered protein-milk may be used in various concentrations. (iv.) The careful transition to cows' milk mixture is seldom accompanied by unfavourable symptoms.

## Special Abstract.

### MODERN STUDIES ON PNEUMOCOCCI.

A VERY valuable report has been published under the auspices of the British Ministry of Health on the bacteriological and serological characters of pneumococci by Dr. A. Eastwood and Dr. F. Griffith.<sup>1</sup> The report really consists of three monographs, each of which will demand the careful attention of bacteriologists, pathologists and clinicians. Since the extraordinary work of Neufeld and Händel, of many of the investigators at the Rockefeller Institute and of Lister in connexion with the differentiation of types of pneumococci, the whole subject has assumed a new and more promising aspect. There are, however, very many questions still to be investigated and settled and it is probable that some of the points at present regarded as settled, may have to be revised and fresh factors discovered before progress will be satisfactory.

#### The Types of Pneumococci.

Dr. Eastwood starts his account with a *résumé* of the now well-known classification into the three American types, I, II, III, and a large group, spoken of as Type IV., which has given rise to much controversy. According to the American workers, Type I. is the commonest, but not the most fatal of the pneumococci. Type II. is but little less common than Type I., but the mortality of pneumonia caused by it is 32% as compared with 25%, which is the mortality of the disease caused by Type I. *Pneumococcus mucosus* or Type III. is far less common than either of the former, but the mortality of the disease it produces is 45%. The Americans found that the heterogeneous group, IV., is relatively common and not very fatal. A complication arises in the American work by the recognition of so-called atypical Type II. pneumococci. They identified this form with Type II. on account of the alleged fact that they are agglutinated by concentrated Type II. serum, but not by diluted Type II. serum. It is held that Type IV. pneumococci represent the usual pneumococci that are found in the mouths of almost every person.

The Americans have succeeded in producing an immune serum in the horse which is useful in the treatment of pneumonia caused by this type of organism, but they have not had success with either Type II. or Type III.

Lister, in South Africa, claimed that he had identified as many as twelve groups. The frequency of his Group C, Group B and Group E, which correspond to the American Types I, II, and III., differed somewhat from the American frequency. One of Lister's groups, Group A, which has been shown to belong to the Type IV. American group, appears to be highly important as a cause of pneumonia in South Africa. Lister vaccinated South African miners with the three most important groups, i.e., A, B and C, and conferred a very considerable degree of immunity on them.

It has been shown by M. Olmstead that the agglutinins and bacteriotropins produced by immunization with pneumococci of Types I, II, and III. are related, but not identical. L. Straker grew Type I. pneumococci in the homologous serum. The result was a lowering of the agglutination with Type I. serum and the acquisition of the character of being agglutinated by Type II. serum. Simultaneously the organism became less virulent.

Blake showed that the immune sera of the various types were precipitated in much higher dilutions by their corresponding types of pneumococci. Very weak precipitin reaction was obtained with the heterogeneous Group IV.. In this connexion, Dochez and Avery claimed to have proved the elaboration of a soluble substance in the young cultures of pneumococci before there was any death of the cocci. They concluded that this soluble substance is consequently not the product of disintegration of the cocci. It is not destroyed by boiling; it is precipitated by acetone, alcohol and ether and readily re-dissolved in water; it is undialysable and not digested by trypsin. It is suggested

by Cole that the power to produce fixing substances is more highly developed in Type I. pneumococci than in Type II. or Type III. and, further, that this may be the chief reason why Type I. serum is much more efficacious than that of any other. This observer found that at times the pleural fluid in pneumonia reduced or abolished the agglutinins and protective substances of the immune serum.

In dealing with the protection test, all experimenters have found that in mice the results are parallel with those of agglutination and precipitation. Work conducted with monkeys, however, revealed the fact that the immunity for the fixed types of pneumococci is associated with some degree of cross immunity and, further, that there is no constant relationship between the protective immunity and the agglutinin content of the serum. In this connexion Dochez and Avery have endeavoured to demonstrate inhibitory properties of the immune serum, which they suggest may be analogous to Ascoli's antiblastic immunity in anthrax. The retarding influence recorded in their protocols lasted only a short time and disappeared at the end of twenty-four hours. Dr. Eastwood gives a brief summary of the American work in support of the contention that the antiblastic hypothesis has a place in the immunity of pneumococci without putting forward his own views.

He claims that the evidence of inter-relationship between the fixed types of pneumococci is slight. He contrasts this evidence with the evidence of the unmistakable differences between the types and the extremely wide range of antigenic difference.

Of importance and interest is the work of Preston Kyes, who utilized fowls in his immunizing experiments. As his results are difficult to explain, Dr. Eastwood refers to them in some detail. Preston Kyes has tested his fowl immune serum in 115 patients, while 538 patients admitted during the same period without distinction received no serum. The mortality among the former was 20.8% and that among the latter was 45.3%. Other clinicians have reported a low mortality as a result of Preston Kyes's serum. It appears that the serum is polyvalent; the cultures are obtained from cultures grown from the blood or lungs of patients with acute pneumonia. Many strains, including four of *Pneumococcus mucosus*, are used. While the serum contains a large number of so-called specific antibodies, Preston Kyes does not regard the agglutinin content as an index of its therapeutic power.

Another somewhat revolutionary doctrine has been started by Nicolle, Jouan and Debains, who claimed that by treating capsulated pneumococci, according to the method of Porges, with dilute acid and then neutralizing the acid, all the types of pneumococci were agglutinated and the heterogeneous Group IV. disappeared. On the basis of their observations they endeavoured to explain the immunization on the assumption of the "mosaic" hypothesis of antigens. Dr. Eastwood discusses this view in detail in his second article (see below). As a result of this study of the work carried out up to the present time, Dr. Eastwood arrives at the conclusion that many difficult questions are raised concerning the underlying principles of immunity reactions.

#### The Incidence of Fixed Types.

Dr. F. Griffith deals with the investigations carried out under the auspices of the Ministry of Health with the view of the determination of the incidence of the fixed types of pneumococci isolated in pneumonia in the London area. The methods of the isolation of the cocci and of the preparation of the agglutinating sera are described in sufficient detail to enable other workers to adopt a similar technique. It is impossible in this place to reproduce these details. Suffice it to point out that Dr. Griffith has endeavoured to establish a technique that can be employed by other workers. A series of one hundred and fifty cases of pneumonia was selected for the purpose. To ascertain whether this series was large enough for the purpose of determining the normal incidence of each of the several types, the series was divided into three sets of fifty each. Dr. Griffith states that, while more than one type may occur in the sputum or lungs, the predominant virulent type which will multiply in the mouse, is the most likely to be the cause of the disease. While the figures are not

<sup>1</sup> Bacteriological Studies: (1) "Review of Recent Work on Pneumococci," by A. Eastwood; (2) "Types of Pneumococci," by F. Griffith; (3) "Serological Differences Amongst Pneumococci," by A. Eastwood; Reports on Public Health and Medical Subjects, No. 13, 1922; Ministry of Health.

uniform, the frequency of the whole series corresponds closely to the figures of the American workers. Type I. was found in 30.6%, Type II. in 32.7%, Type III. in 6.7% and the Type IV. group in 30%, as compared with 33.3%, 29.3%, 13% and 20.3% respectively. The Americans found 4.2% of what they describe as "atypical Type II."

Dr. Griffith deals in some detail with the atypical pneumococci. He isolated forty-five strains that did not agglutinate with any of the fixed type sera. He found some that would be classed as "atypical Type II." of the Rockefeller Institute, inasmuch as they were agglutinated by concentrated Type II. serum, but not with dilute serum. He finds that the serological evidence indicates that these are distinct types. Agglutinating sera were prepared of several of these atypical strains. The result of this work was the differentiation of twelve distinct strains. Dr. Griffith would wish to label these pneumococci as Type IV.A, Type IV.B, etc., rather than Type II.A, Type II.B, etc. In all seventy-seven of these strains were isolated and it was found that they fell into one or other of the twelve groups. It would appear that they were probably common inhabitants of the nose and mouth, but under certain conditions they seem to be capable of giving rise to lobar or broncho-pneumonia or other pathological conditions. Dr. Griffith is not prepared to attach much importance to the alleged relationship of these strains to Type II. pneumococci.

In support of the contention that Types I., II. and III. are serologically distinct strains, he has carried out a considerable amount of work to ascertain the power of the homologous sera to protect against infection with the corresponding types. The virulence of certain strains of Type I. and Type II. pneumococci was found to be 0.0000001 cubic centimetre (i.e., the amount required to kill mice in two days). The amount of the homologous serum that was capable of protecting mice against 0.1 cubic centimetre of the cocci was 0.1 cubic centimetre, but 0.2 cubic centimetre failed to save the mice from a fatal infection after the injection of the minimum lethal dose of pneumococci of another type. This proved true of the three fixed types. In regard to Type IV. strains, it was shown that none of the sera corresponding to the three fixed types conferred any protection against pneumococci of Group IV.. On the other hand, protection was obtained with the homologous sera. Some delay in the fatal result was effected with the sera corresponding to the atypical strains of Group IV. other than that of the strain being tested.

Two hypotheses have been put forward to explain the fact that the fixed types commonly producing pneumonia tend to be replaced by avirulent pneumococci of the heterogeneous group. The first is that the type strains die out. The second is that the virulence of Type I. or Type II. pneumococci becomes attenuated during convalescence and that this change is accompanied by a mutation of type characters. Against these views are two observations. Some of the strains of Group IV. pneumococci seem to be very virulent for mice. It is therefore not justifiable to assume that loss of virulence is characteristic of Group IV. strains. In the next place Type I. or Type II. strains may become avirulent after prolonged subculture, although their agglutinability remains unchanged. Dr. Griffith recognizes that a mutation might occur in the living organism that cannot be demonstrated *in vitro*. He therefore sought for evidence of regularity of the serological characters of the pneumococci that apparently replace those of Type I. or Type II. during convalescence. At the outset he found that it is very common to meet with atypical bile-soluble diplococci in association with fixed type pneumococci even during the acute stage of the pneumonia. Types I. and II. have not been isolated from the same sputum. The second type complicating Type I. or Type II. infections have always been strains of Group IV.. Dr. Griffith has in many instances identified these strains as belonging to two of his twelve distinct strains. He is not prepared to draw any conclusions from this fact at present.

The American workers have shown that the precipitate resulting from the addition of an autolysed culture with the corresponding immune serum contains the protective substances of the serum. Neufeld has endeavoured to ex-

plain the mode of action of this protective substance. He has assumed that it is of a bacteriotropic nature and that it is strictly specific to the particular strain of pneumococcus employed. Dr. Griffith relates the details of experiment which show that the protective properties of the sera can be precipitated without impairment by heating and washing the suspensions of the pneumococci. Similar results were obtained with the peritoneal washings of a guinea-pig that had been inoculated intraperitoneally with living cocci. He is not prepared to regard this as direct evidence of bacteriotropic character of the protective substance. Attempts to sensitize living Type I. pneumococci were apparently unsuccessful. Some of the mice treated with the washed cocci that had been in contact with the corresponding serum, survived. Their survival was due, in Dr. Griffith's opinion, to the protective substance inoculated along with the culture. Dr. Griffith next carried out some absorption experiments in the usual manner to study the protective power of the serum. The agglutinins and other antibodies were removed from the sera by treatment with the homologous strains. It was found that the sera had lost the protective power for mice. Great difficulty was experienced in the endeavour to remove the protective substances from the sera of Group IV. strains. In other experiments it was shown that the re-inoculation of immunized rabbits whose serum possessed weak agglutinating powers, resulted in a slight revival of this power and an increase of the protecting power, reaching its maximum on the fifth day. The serum manifested some irregularity in regard to its protecting powers against mice inoculated with the corresponding strains. From these and other experiments Dr. Griffith concluded that there is no firm union between the antigen and the antibody and no neutralization of the protective substances.

#### The Mechanism of the Immunity Processes.

In the third article Dr. Arthur Eastwood discusses at considerable length the possible modes of action of the immune sera from animals treated with the various types of pneumococci. He uses as a starting point the fact that a large number of different serological races of pneumococci have been demonstrated and from the evidence available this number is so large that an inclusive classification is at present impossible. If one specific substance were common to all virulent pneumococci, an antiserum prepared from a single typical strain might prove protective and curative in all cases of pneumonia. The minor antigenic differences might be disregarded. It had been found, however, that the immune serum was useful only against strains which were identical with the strains used for immunization. In order to attack the problem in a thorough manner Dr. Eastwood discusses the known facts concerning the antigens and their antibodies with special reference to the pneumococci. It is usually held that substances which act as antigens, contain large and highly complex molecules and are of a proteid nature. It has further been suggested that every antigen possesses an aromatic nucleus. This nucleus figures as the central ring for the grouping of side chains. The chemical specificity of the antigen will depend on the arrangements of these side chains rather than on the nature of the aromatic nucleus. In accepting these general ideas the author postpones until a later stage all discussion on the significance of the colloidal conditions. In dealing with the changes in the specificity he illustrates the conception of a dominant antigen. If a protein be converted into a nitro-protein by the action of nitric acid, the original specificity of that particular protein is lost and is replaced by a group specificity common to all nitro-proteins and peculiar to them. He suggests that the general rule that all true vibrios of Asiatic cholera are agglutinated by a standard serum, may be explained on the assumption of a dominant antigenic specificity.

In order to show the complex nature of certain antigens he cites the instance of an antiserum prepared by immunizing with diazobenzol-ox-protein. This antiserum precipitates only diazobenzol-ox-protein; it does not precipitate normal ox-protein nor the diazobenzol compound of the protein of other animals. In endeavouring to apply the principle underlying the limitation of a specific reaction to pneumococcal serum he suggests that all pneu-



mococci contain one common antigenic nucleus (N) and that racial differences are produced by the addition of special antigenic properties (b, c, d and so on). Thus Nb antiserum would react only with Nb antigen, but not with Nc nor Nd antigen.

Under certain circumstances multiple antigenic components may acquire common properties when linked with new chemical substances. When a protein of a serum is linked to diazobenzol, its antiserum reacts to itself in the ordinary way. But when nitro-protein or diazo-protein with a naphthol are linked up with diazo-benzol, it is found that their antisera react equally well with protein-diazobenzol. It should be recognized that the antigens protein, diazo-protein and nitro-protein have nothing in common, but acquire a common antigenic action when linked up with diazobenzol. This explanation is offered for the apparent anomaly of serological differences and serological similarities which exist between meningococci and the Flexner group of dysentery bacilli.

Dr. Eastwood presents a further mechanism which at times occurs in experimental biochemistry. The secondary antigen may remain concealed as a result of some complex combination with other components of the proteid molecule. The antiserum of protein with diazobenzol does not precipitate iodized ox-protein with diazobenzol.

The question of chemical instability must also be taken into account. Under the influence of heat or cold or certain chemical substances which do not in themselves induce profound changes in proteid structure, definite antigenic characters may disappear. Among these are formaldehyde, chloroform and dilute alkali. It is suggested that the lability of antigens may lead to their modification in the living body and to the appearance of new antigenic qualities. According to this view an antigenic function would depend on a chemical group which is present in an active state in the original molecule, or which exists in a masked condition in the original molecule and is liberated by the removal of inhibited conditions, or which arises in the molecule in the course of certain changes. Neufeld's mosaic pattern theory disregards the third possibility. According to this theory protein molecules contain preformed chemical groups endowed with antigenic powers. In the production of an immune serum each unit of the antigen mosaic would give rise to a corresponding group in the serum. The antigen-antibody reaction, which is regarded as subject to favourable colloidal conditions, has been explained on the assumption of the "lock and key" hypothesis of Emil Fischer.

Dr. Eastwood mentions various objections to the mosaic pattern hypothesis. It has been found that normal sera react with a variety of substances. To explain these non-specific reactions numerous structural groups in the normal serum would have to be postulated, each of which would fit exactly the corresponding group in the various antigens. In other words, normal serum would have to contain a special mosaic with innumerable units, each having a specific affinity for a corresponding antigen that reacts with it, while immune serum would contain, in addition, a mosaic with units acquired by immunization. Again, in the production of antibodies non-specific factors may be important. It is well known that in the production of an agglutinating serum, the titre rises steadily if the immunization is continued with a bacillus of a different species. Other instances of non-specific reaction are recognized. The mosaic pattern hypothesis would fail to explain these phenomena unless an incredible number of antigenic parts were postulated. While this hypothesis offers an ingenious explanation of a biological nature, Dr. Eastwood holds that it travels far beyond the confirmatory data of the biochemist. He is not prepared to accept as a serious proposition that the combining capacities of many antigens or antibodies are units that pick out each other, leaving the rest of the mosaic as it was. He assumes that this would mean a different and independent protein vehicle for each different unit.

Antigens are of necessity proteins and must exist in a colloidal condition. There is a third quality. They must be in a condition suitable for the stimulation of the production of antibodies. It is usual to refer to the protein as being "foreign," but it is difficult to define the exact meaning of the word "foreign."

Apart from the chemical qualities of antigens, there are some essential physical essentials. In all colloidal conditions quantitative relationships of the interacting substances are of importance. In order to obtain the optimum reactions between antigens and antibodies the proper quantitative relations between these bodies is necessary. The reaction may be the simple union between two colloids or the colloids may bring about a destruction of lipid-protein combination, with the release of the soluble cellular contents. The presence of a third colloid may influence the reaction. Dr. Eastwood expresses the opinion that the idea of a pure antigen is merely an abstract one. The participants in antigen-antibody reactions are large colloidal complexes and are not substances possessing definite chemical individuality in the ordinary sense of the term. It would appear that the specific action of an antigen is the resultant of a series of phenomena which may follow one another in causal sequence. In immunity it is thought that the intermediate reactions may provide energy for the following reactions.

An extremely ingenious, but complicated, conception is adduced of the chemo-physical equilibrium of antibodies. It is known that amboceptors continue to appear in the animal body long after the antigen has been withdrawn. Ehrlich spoke of this as a "habit." It is suggested that in vital processes there are interactions between the various colloidal constituents of the humoral and cellular elements of the body. These interactions tend to find an equilibrium. This equilibrium may be regarded as the resultant of all the bodily forces at work. It may be disturbed when a new factor is introduced and a new equilibrium may be established. This new equilibrium may be the essence of a property spoken of as acquired immunity, while natural immunity may be the old or original equilibrium. Dr. Eastwood admits that this view is somewhat hazy and intangible, but he finds it useful for the purpose of removing the use of the word "habit" and of obviating the tendency of explaining the reaction as a simple one, depending on the presence of a particular substance spoken of as antibody, while in reality it must depend on many highly complex factors.

He anticipates that many undiscovered antibodies are concerned in immunity reactions in addition to the known precipitins, agglutinins, antitoxins, bacteriotropins and so on. He does not suggest that there are separate substances for each; some of the antibodies may be different properties of the same substance. In addition to the presence of antigens and antibodies other properties are evidently concerned with immunity reactions. He cites resistance to saprophytes, resistance on the part of a susceptible animal to small quantities of parasitic bacteria and resistance of an animal that is naturally immune. In acquired immunity the part played by resistance is also important. In some bacterial infections the specific immune sera are obviously independent of all demonstrable antibodies. He is not prepared to offer any scientific explanation of the process underlying the presence of natural immunity, nor to define the nature of the mechanism at work in acquired immunity in addition to the existence of antigen and antibodies, supplemented by complement action and phagocytosis.

Having dealt in detail with these aspects of the problem of immunity generally, he seeks to examine the question of pneumococcal immunity processes. Pneumococci exhibit a large number of varieties as antigens. He holds that the differences of the variants may be explained as limitation of the specific reaction due to multiple antigenic components. He does not suggest that the different races of pneumococci represent different dominant antigens. The very large number of variants has led investigators to endeavour to include in the antiserum as many antibodies as possible. Within more recent times the majority have given up this attempt to produce polyvalent sera. They find it more useful to concentrate their attention on a relatively small number of varieties which comprise the majority of strains isolated from the sputum.

Dr. Eastwood finds reasons for assuming that the antigenic differences are usually stable. He is inclined to the view that the animal body may be capable of transforming one antigenic variant into another. Another view is that

certain variants become annihilated and their place taken by other variants. He cannot accept the mosaic conception either in a literal sense or in the more obvious modifications to pneumococci. More information is needed to disclose the interactions that take place between pneumococci and the living body. Though the influence of chemical elements cannot be ignored, it would seem that the individuality of the antibodies is to be regarded as the expression of a particular balance of colloidal forces rather than the attribute of one particular chemical structure.

In turning to the question of the therapeutic value of the pneumococcal antibodies, Dr. Eastwood claims that the results of the protection tests on mice have demonstrated that certain specific substances prevent the corresponding variety of pneumococcus from gaining an initial foothold in the animal body. He finds that this may be the result of the precipitins and agglutinins in the immune serum or it may be attributable to the action of these substances in modifying the cocci in such a way as to make them susceptible to the natural defensive mechanism of the animal. Against the first assumption is the fact that the precipitin, agglutinin and other antibody content of the immune sera does not always run parallel with the protective power. He points out, however, that care should be exercised before too much importance is attached to the results of the experiments on mice. Apart from all other considerations, it must be admitted that the real nature of the protective substances is unknown. Some of the animals become immune to the homologous strain of pneumococci and to no other and no specific antibody can be demonstrated in the serum. Other animals have been described whose serum contains the usual specific antibodies, but who have not become immune. It thus appears that active immunity must depend on factors other than the specific antibodies. Even in connexion with passive immunity the mechanism is not quite simple. The author is apparently disinclined to believe that the solution of the difficulty lies in the search for fresh, hitherto unknown specific antibodies.

In gathering the most important data, before attempting to draw even tentative conclusions concerning the mechanism of the pneumococcal immunity reactions, Dr. Eastwood sets out four methods by which chemical specificity might manifest itself. In the first a definite antigenic structure which is common to all members of a species and which always acts as an antigen, is postulated. In the second each member is held to possess a common nucleus of antigenic structure, to which various chemical groups may be attached. The antigenic action would then be determined by the combined factors. In the third suggestion it is assumed that there are various antigenic structures or nuclei to which various chemical groups may be anchored. In such a case the antigen would react with any serum containing antibodies to either components. The fourth hypothesis is that, while the antigenic structure is as complex as in the third suggestion, under certain circumstances there may be reversion to the inhibition postulated under the second mechanism. In his discussion he discards the mosaic pattern theory as unsubstantiated in fact and unsound in principle. It is held that a good antigen should be composed of molecules which are not rapidly broken up in the animal body. It is essential that the antigen shall be able to act for a sufficiently long time to enable it to stimulate antibody production. He warns the reader not to transfer the simple conception of the neutralization of a toxin by antitoxin to the conditions obtaining in connexion with susceptibility and resistance. It would seem that the half-formed explanation of a balance mechanism may prove useful as a working hypothesis. Much more evidence would be required before each serologically distinct strain could be regarded as a distinct species. He admits that it may be theoretically possible for one type to undergo mutation into another type, but the persistence of type in prolonged subculture rather suggests that mutation does not occur.

He concludes by stating that the study of the serological differences among pneumococci has not led to any final conclusion that would justify the opinion that no serum will be therapeutically efficacious unless it contains an antibody corresponding to the antigen which is peculiar to the infecting strain.

## British Medical Association News.

### SCIENTIFIC.

A MEETING of the South Australian Branch of the British Medical Association was held in the Lister Hall, Hindmarsh Square, Adelaide, on September 28, 1922, Dr. T. G. WILSON, the President, in the chair.

#### Adeno-Myoma of the Uterus.

DR. ALEXANDER NICHOLAS KRAKOWSKY read a paper on "A Case of Adeno-Myoma of the Uterus with Chronic Endometritis" (see page 642).

DR. T. G. WILSON stated that he was interested in Dr. Krakowsky's paper. He thought that the diagnosis would have been more satisfactorily established had a piece of the growth been removed for microscopical examination.

DR. A. N. KRAKOWSKY expressed the opinion that no diagnosis other than that of adeno-myoma could have been made.

#### Obstetrical Practice.

DR. HENRY GILBERT read a paper on "Obstetrical Experiences During Fifteen Years of General Practice" (see page 631).

DR. A. A. LONDON, in opening the discussion, congratulated Dr. Gilbert on his paper. One aspect he noticed had not been touched on; that was the thyroid treatment for eclampsia. He (the speaker) had found an examination in the early stages of pregnancy very important and also further examination at the thirty-sixth week. He frequently examined *per rectum* in preference to vaginal examination. With regard to asepsis and the use of gloves, he did not think that more trouble from septic infection occurred in the days when the use of gloves was unknown than at the present time. He used "twilight sleep" as a routine. Formerly he had administered ether as an anæsthetic, but was now converted to chloroform on account of the more easily obtained anæsthesia of the patient; he also thought it tended to hæmorrhage.

DR. HUMPHREY MARTEN congratulated Dr. Gilbert on the successful delivery of the double monster described in the paper. In reference to the operation of Cæsarean section he mentioned that in the course of forty-four years he had not seen one patient on whom Cæsarean section had been performed. He found it difficult to understand the present prevalence of this operation.

DR. W. T. HAYWARD, C.M.G., wished to endorse the remarks made by Dr. Marten with reference to the prevalence of the Cæsarean section. In his own experience he could only recall two instances in which he had considered Cæsarean section necessary. The performance of a Cæsarean section was not an operation, in his opinion, that a practitioner should look on with pride. He related a severe case of eclampsia in which recovery followed after venesection and one or two others in which a similar result was not obtained by the same method. Latterly he had used morphine in place of venesection.

DR. P. CHERRY stated that he was interested to hear Dr. Gilbert's description of eclampsia occurring twice in the same patient. He would like to know Dr. Gilbert's prognosis in eclampsia associated with a considerable amount of œdema.

DR. H. C. NOTT referred to the assistance of radiography in the diagnosis of the position of the fœtus; at the fifth month the position could be easily demonstrated.

DR. T. G. WILSON referred to the teaching of obstetrics; he thought that in Adelaide, at all events, the practical teaching to medical students of obstetrics was no better than it was thirty years ago. In the hospital wards it could not but be realized that much of the gynaecological suffering of women was due to faults at labour. In this respect the use and application of forceps called for careful instruction and teaching. He felt that the clinical teaching of obstetrics left much to be desired and did not think it would be satisfactory until proper obstetrical

wards had been established at the hospitals. Obstetrical teaching should be on the same lines as that of medicine and surgery. With reference to gloves, he had for many years used them. He agreed with Dr. Gilbert that in cases of toxæmia, ether administered by the open method was better than chloroform, owing to the tendency to acidosis.

He thought that the pendulum had swung over to Cæsarean section and the field for this operation was very narrow. He quoted figures from several obstetrical institutions in Europe in support of this. With reference to *placenta prævia*, he thought Dr. Gilbert had been unlucky in a large number of his cases. Dr. Gilbert had not differentiated between pueritis complicated by pregnancy and eclampsia. He thought that possibly a great number of women with *placenta prævia* miscarried at an early date. In these cases, plugging of the vagina should be done properly and efficiently. He agreed with Dr. Gilbert that embryotomy should not be done on a viable child, except under rare conditions. He regarded routine examination of the urine as very important. Even if it were possible by this means to ward off only one or two attacks of eclampsia, the trouble taken would be amply repaid.

Pre-maternal care had enormous potentialities in saving life. He had seen considerable adverse criticism against the use of morphine and scopolamine on account of supposed ill-effects on the child. He had used morphine and scopolamine and had not noticed any ill-effects. These drugs tended to minimize the too early interference with forceps. The use of forceps when the head was low down was another matter. The use of pituitrin had lessened the danger of *post partum hæmorrhage*. When it was employed *ante partum* it was valuable, but care had to be taken against disproportion between the passenger and the passage and other obstructions.

Dr. C. DUGGID remarked that he preferred to examine primipara at three weeks from full time rather than at the seventh month, as mentioned by the President, because of the much greater information available at that time. In a primipara the head began to sink into the pelvis during the last three weeks and if during bimanual examination the head could not be induced to enter the pelvis and the estimation of the date of pregnancy was correct, it could be assumed that something was abnormal in the passenger or the passage. Quite a slight disproportion could be ascertained by examining at the thirty-sixth or thirty-seventh week. In regard to the teaching that examination during labour should be avoided, he said that there was one occasion where it was necessary, *viz.*, after a sudden rush of *liquor amnii*, to ascertain whether there was any prolapse of the cord.

Dr. GILBERT, in reply, said that he had used thyroid extract in the treatment of eclampsia, but was not convinced of its efficacy. He had not practised rectal as opposed to vaginal examination. He preferred ether on account of its greater safety and was convinced that its use did not increase the liability to hæmorrhage. He had seen two cases of Duchenne's paralysis. With regard to the application of forceps, he did not use them before dilation was complete and did not leave a patient for more than two hours. He had tried venesection in two patients with eclampsia, but without relief. He regarded the prognosis of eclampsia with well developed œdema as being more favourable.

Dr. Cherry had commented on the case of recurrent eclampsia quoted, but the question was not answered at the time. A reference was to be found in Jardine's "Clinical Obstetrics." Several recurrences were quoted and an estimate of 1% made by Olshausen was stated to be probably very near the mark. He doubted if radiography would show more than the existence of twins.

He emphasized the care he took to keep his hands clean enough to carry out the greater part of his midwifery work without using gloves. He had recognized the relationship between *placenta prævia* and abortion for some time, but could not say for how long. He could not definitely state the source of the knowledge.

A MEETING of the New South Wales Branch of the British Medical Association was held at the Royal North Shore Hospital of Sydney on October 13, 1922, the President, Dr. T. W. LIPSCOMB, in the chair.

#### Operative Treatment of Infantile Paralysis.

Dr. S. H. SCOUGALL showed a boy, aged nine years, who had been treated at the Royal North Shore Hospital, both as an indoor and as an outdoor patient for the previous two years. When the boy had first come to the hospital, he had given a history of an extensive anterior polio-myelitis some four years previously. *Talipes calcaneo-valgus* had been present, there had been a paralysis of all the posterior group of muscles, allowing approximation of the dorsum of the foot to the antero-lateral aspect of the leg. With the foot placed on the ground the medial malleolus had formed part of the weight-bearing area. There had also been paresis of the anterior and peroneal groups of muscles. Massage, muscle training and other therapeutic measures had been carried out for eighteen months, the optimum position of rest for the affected muscles being maintained by a celluloid splint. It had subsequently been decided to undertake operative measures by the Whitman operation. The peroneal tendons had been divided about 1.25 centimetres beyond the tip of the malleolus and the talus had been removed. The cartilage had been removed from the inner surface of both malleoli and the foot had been dislocated backwards, the malleoli finally resting on surfaces prepared for them by paring off portions of the cuboid and navicular bones. With the foot in a position of slight equino-valgus the peroneal tendons had been passed through the *tendo Achilles* near its insertion and had then been joined to their distal portions. Fixation to the *tendo Achilles* had been made by kangaroo tendon. The position of equino-valgus had been maintained by plaster carried above the knee and the leg had been kept elevated. The boy had experienced practically no inconvenience. The knee had been freed from plaster after four weeks and the remainder of the plaster had been removed eight weeks after the operation, the wound having healed under the plaster. A removable plaster walking splint had been used for a further period of four weeks, together with a cork sole to maintain slight equino-valgus. Re-education and other measures were being carried out at the time of the meeting.

Dr. Scougall pointed out that by this operation there was a shortening of about 0.8 centimetre (one-third of an inch), which did not occur in the Naughton Dunn method of stabilizing such conditions. In this patient there were other extensive paralyses and Dr. Scougall drew attention to the fact that, as a result of the operative procedures he had detailed and of other operative measures, the boy, who had previously been unable to stand, had reached a stage at which he was able to walk alone.

Dr. Scougall's second patient was a child who had suffered complete paralysis of both tibialis muscles and a paresis of the *flexor digitorum longus*, producing a valgus condition with a lateral displacement at the heel. Physiotherapeutic measures had been used for two years, together with appropriate splinting. Dr. Scougall had subsequently divided the *peroneus longus* muscle low down and had freed it to about half way up the leg. The talo-calcaneal joint had been opened and the bones separated sufficiently to allow the removal of the articular cartilage. It had been necessary to remove a wedge-shaped piece of bone from the upper surface of the calcaneus with the base inwards in order to secure contact in good position. An antero-posterior incision about five centimetres long had been made with it centre over the talo-navicular joint and a wedge including the joint had been removed. The tendon of the *peroneus longus* had been brought down in a straight line through a broad tunnel in the fat to an insertion beneath the periosteum into the soft bone of the scaphoid, kangaroo tendon having been used for fixation. The corrected position had been maintained by plaster prolonged above the flexed knee and the leg had been kept suspended from a cradle for eight weeks. The child had suffered little discomfort. Massage and re-education had since been carried out and at the time of demonstration the foot remained stable on standing with a good degree of dorsiflexion and a moderate degree of plantar flexion.



Dr. Scougall's third and fourth patients had shown indications for arthrodesis of the shoulder of a somewhat similar nature. Both were young, aged eight and ten years respectively. Both had had paralysis of the deltoid and of the external rotators of the shoulder; in neither case had a good *pectoralis major* been available. Scapular movement in each patient had been moderately good, but the arm of each had shown a considerable difference. In one the remaining muscles had been normal and in the other the muscle had been so severely affected that it had been doubtful whether arthrodesis was worth performing. Approximation of the denuded surfaces of the glenoid cavities, head of humerus and inferior portion of the acromion process had been made by wire passed through each. The arm and chest had then been enclosed in plaster, an effort having been made to keep the arm at an elevation of 60°, half way between abduction and flexion with such rotation as would allow the hand in the pronated position to be brought to the mouth. Eight weeks later the plaster jacket having been made into a removable splint, physio-therapy and re-education had been commenced. A sling had been used two weeks later and after a further period of two weeks this had been discarded. At the time of demonstration the functional result in one patient was better than in the other. This was due partly to the fact that the former had had two months more after treatment than the latter. Dr. Scougall pointed out that the patient with the defective musculature of the arm would wear a light adjustable elbow joint.

#### Sciatica and Diathermy.

DR. SCUGALL also showed a male patient, aged thirty-four years, who had been sent to hospital for treatment for acute sciatica on September 21, 1922. He had arrived at the hospital at about midday, walking with great difficulty and had been in such pain that hot air had been applied pending Dr. Scougall's arrival at two o'clock in the afternoon. On examination great tenderness had been present along the course of the sciatic nerve and any stretching movement had caused severe pain. The application of hot air had afforded no relief. The indifferent electrode, a large pad, had been placed on his sacral area and another 2.5 centimetres in diameter had been used as the active electrode. Beginning over the exit of the sciatic nerve the active electrode had been applied successively along its course down to the limit of the tender area. Such a current had been used as would make the heat become intolerable in about fifteen seconds. The amount of current had been increased in the more distal portions of the nerve. At the completion of treatment, which had occupied fifteen minutes, the man had been practically free from pain. His face had lost the drawn expression and he had been able to walk freely. He had walked to his home, a distance of about three-quarters of a mile. The pain had returned that night, but in a less severe form.

The patient had subsequently undergone four treatments at intervals of two days. Each treatment had afforded relief from pain which had generally returned with less severity. After the fifth treatment he had remained free from pain, tenderness has disappeared and at the time of demonstration stretching movements caused the little discomfort. Dr. Scougall said that the only known effect of diathermy was deep heating, but that it seemed probable, as Cumberbatch had said, that there was some other action at present unknown.

#### The Whitman Weak-Foot Plate in Celluloid.

DR. SCUGALL demonstrated a foot plate made of celluloid and in doing so said that it might often be desirable to use a support to the arch of the foot during the re-education of postural activity in treating patients suffering from mobile weak foot. This was likely to happen when relief was not afforded by the valgus wedge in the sole of the boot and by such measures as contrast bathing, massage and corrective exercises. In some of these patients the difficulty might be met by using a moulded sole raised still further on the inner side; in others a temporary support might be needed. In making such a temporary support by the Whitman method a mould or cast was taken of the foot in the position of over-correction with slight adduction of its fore part. The cast made in this way was

trimmed and the arch pared away according to the severity of the condition. Instead of an eighteen gauge sheet steel moulded on this cast, Dr. Scougall had for some time past built them up of celluloid. He said that the celluloid plates were lighter and more adaptable to the shape of the mould. The main difference to the ordinary supports was a lateral flange over the calcaneo-cuboid joint. Lateral slipping was thus prevented, gentle lateral pressure on the arch was maintained and any pronation of the fore part of the foot brought its lateral border against the anterior edge of the flange. This led to repeated voluntary efforts at adduction and inversion until the postural activity was regained. Such a brace was therefore curative in addition to being a temporal support.

#### Congenital Shoulder Lesion.

DR. SCUGALL showed a boy, aged four and a half years, for purposes of diagnosis. The boy suffered from a congenital lesion at the shoulder and Dr. Scougall pointed out that the habitual attitude was one of partial abduction and flexion. Atrophy was not apparent. Much of the shoulder movement was scapular. If the scapula were fixed, flexion and abduction were almost absent, while the amount of rotation was not appreciably altered. On palpation the head of the humerus could be felt below the acromion process and posterior to the glenoid artery. Dr. Scougall thought that the diagnosis of congenital posterior dislocation of the shoulder was supported by the normal electrical reaction of the muscle and by the X-ray findings. If the condition was a congenital dislocation, it was, as stated by Abbé, rare even in orthopaedic practice. Dr. Scougall asked if any of the members present had had any experience of the condition and what success they had gained in its treatment.

#### Uterine Hæmorrhage with Polycythæmia.

DR. J. L. T. ISBISTER showed a patient, aged twenty-seven years, the mother of two young children, who had sought advice for excessive uterine hæmorrhage at the menstrual periods, which came every twenty-eight days and lasted ten days. She has been curetted on four occasions during the previous three and a half years without any permanent relief. The periods had gradually increased and the patient had appeared to suffer from some variety of hæmophilia. Further palliative treatment had been useless. After treatment with calcium lactate for some weeks, sub-total hysterectomy had been performed. The uterus had been normal in size and position and a pathological examination had shown nothing abnormal, except some vascularity of the endometrium. Ten days after operation blood had gushed very suddenly from the vagina. There had been no sepsis. After the bleeding had been arrested by plugging, the patient had been very blanched, but had recovered her colour in a few weeks. After a period of practically normal health the nose had begun to bleed intermittently and there had been monthly attacks of vomiting and chilliness, apparently corresponding to the times of the monthly periods. Six months after the operation menstruation had started again, the blood coming from the small cervix left from the operation. At the time of demonstration, sixteen months after the operation, the patient was enjoying moderately good health.

Dr. Isbister said that after a hæmorrhage the red blood corpuscles numbered over eight million in each cubic millimetre. There was an occasional hæmorrhage into the subcutaneous tissues of the thigh or upper part of the leg. This was preceded for a few hours by a burning pain at the site of the hæmorrhage. There was no enlargement of the spleen or other obvious pathological condition. The patient stated that her mother died of uterine hæmorrhage, that her sister died of hæmorrhage at child-birth and that her daughter bled freely from the nose or if cut, but that her son showed no abnormal signs.

#### Intestinal Obstruction.

DR. ISBISTER also detailed the history of a patient, aged thirty-three years, who had been operated on for pyosalpinx. Sixteen days after the operation intestinal obstruction had gradually developed, due to a plastic peritonitis gluing the small intestine in and around the site of operation. Dr. Isbister had subsequently opened the abdo-

men in the left semilunar line. It had been clearly impossible and impracticable to free the tangle of gut and the small intestine had been opened and an artificial anus made. Eight weeks later this had closed spontaneously and, although the patient had been free of obstructive symptoms, she had complained of abdominal pains of a gripping character. Six months later the abdomen had been opened again in the middle line. A few adhesions had been found, one at the site of the artificial anus being firm. The general mass of adhesions had disappeared.

#### Pathological Exhibit.

DR. ISBISTER also showed a large gall stone, five centimetres long and 3.1 centimetres wide, that had firmly blocked the small intestine of a patient seventy-two years of age, who had suffered intermittent attacks of intestinal obstruction. A hard mass had been felt in the posterior fornix on vaginal examination, but its exact location had not been determined. At operation the coil of gut had been discovered lying in Douglas's pouch and the gall stone had been removed.

#### The Van Den Bergh Test.

DR. W. W. INGRAM demonstrated the results of the Van den Bergh test for the differentiation of obstructive from other types of jaundice. Dr. Ingram said that the test was based on the work of Ehrlich, who had shown that bilirubin dissolved in chloroform or alcohol combined with diazo salts to form azo dyes. Van den Bergh had shown that the reaction was very sensitive and he had claimed to be able to detect bilirubin in a dilution of one part in one and a half million. Van den Bergh's work dealt not only with the differentiation from catarrhal or hæmolytic jaundice, but also with the value of bilirubin estimation in latent jaundice, diseases of the liver, blood, etc. At the Royal North Shore Hospital of Sydney, with a limited number of patients suffering from jaundice, Dr. Ingram had been testing the bilirubin content of the serum and interpreting the results as laid down by Van den Bergh. The patients were being subsequently operated on by Dr. Bligh to determine the true nature of the case. Dr. Ingram detailed shortly the following results:

**Case I.**—The patient's condition had been diagnosed clinically as catarrhal jaundice. The Van den Bergh test had given a positive result by the indirect test. This had indicated non-obstructive jaundice. Operation had confirmed this and the patient had made an uninterrupted recovery.

**Case II.**—The patient had not been jaundiced and no reaction had been obtained by either the direct or indirect Van den Bergh tests. On operation a suppurative cholecystitis without obstruction had been found.

**Case III.**—The patient had been jaundiced. The Van den Bergh test had yielded a positive result by the indirect method. At operation an infective cholangitis without obstruction had been discovered.

**Case IV.**—The patient had been jaundiced. The Van den Bergh test had yielded a positive result by the indirect method, indicating non-obstructive jaundice. At operation a large gall stone had been found in the common duct, which had been enormously dilated. The surgeon had been of the opinion that there was no obstruction to the flow of bile.

**Case V.**—The patient had not been jaundiced. The Van den Bergh test had not yielded a result by either the direct or the indirect methods. At operation a suppurative cholangitis and pancreatitis had been found.

**Case VI.**—The patient had been jaundiced. The Van den Bergh test had yielded a positive result by the indirect method, indicating the presence of non-obstructive jaundice. At operation a large gall stone had been found in the gall bladder, but there had been no obstruction to the flow of bile.

Dr. Ingram said that he thought that much work would yet have to be done before the value of the test in clinical medicine was determined.

#### Sacculation of the Bladder.

DR. E. A. R. BLIGH showed a female patient, aged fifty-two years, who had complained of "dribbling of the urine"

for the previous eighteen months. The condition had developed gradually, the patient having noticed that she was unable to pass a considerable quantity of urine at one time and also that she was unable to control micturition. The condition had continued with variations in intensity. At times she had suffered from attacks resembling renal colic. Headaches and shivering attacks had been of frequent occurrence. There had been no hæmaturia. There had been no symptoms associated with the circulatory, respiratory or renal systems. The patient had had hysterectomy performed eleven years previously for a complaint the nature of which could not be discovered. Examination of the patient had shown her to be well nourished. Nothing abnormal had been detected in the respiratory or the circulatory systems. The abdomen had moved freely on respiration. There had been tenderness in the suprapubic region. On vaginal examination a tense mass, not tender, of even consistence had been discovered in the anterior fornix, bulging down into the vagina. The cervix had been absent, but definite cicatricial bands had been present in the upper part of the vagina. Attempts to catheterize the bladder with rubber, *coudé*, glass and metal catheters had proved fruitless. Dr. Bligh said that he had then passed a Hegar's sound through the urethra and drained off the contents of the bladder, consisting of almost pure pus. Culture had shown that *Staphylococcus aureus* was the causative organism. Cystoscopic examination by Dr. Silverton had revealed nothing abnormal in the urethra or bladder except that the posterior wall of the bladder had seemed far back. Bladder irrigations undertaken twice daily had soon been successful in relieving the incontinence. The amount passed by the patient had varied from sixty to one hundred and twenty cubic centimetres. On catheterization another three hundred cubic centimetres had generally been secured. For the two weeks prior to the meeting the amount secreted in twenty-four hours had ranged from two and a quarter to four litres. She could pass from three hundred to four hundred and fifty cubic centimetres, but residual urine varied from nine hundred cubic centimetres to 1.4 litres twice daily. No sugar nor albumin was detected in the urine. No pus, red cells nor casts were present. On October 12, 1922, an abdominal section had revealed the presence of large bands of adhesions between the posterior surface of the bladder and the sigmoid and between the anterior wall of the bladder and the anterior abdominal wall. The bladder had been found to be large, with atonic walls. Continuous drainage had been secured by a de Pezzer catheter.

#### Syphilitic Ulceration of the Larynx.

DR. BLIGH also showed a male patient, a young man, who had been treated at the out-patient department for two years for syphilitic disease of the larynx. He had been admitted to hospital on July 18, 1922. On the day of admission the patient had developed acute respiratory distress during a sudden fit of coughing. On arrival at hospital a few minutes later he had been asphyxiated, cyanosed and sweating and respiration had practically ceased. Intubation had been performed and the patient had immediately revived. The tube had been coughed up six hours later, but no dyspnoea had developed. Eight days later thyrotomy had been performed and the vocal cords had been found ulcerated and congested. Since operation the patient had suffered no respiratory embarrassment, the voice was becoming stronger and he could speak in a hoarse whisper. Treatment that was being administered consisted of mercurial inunctions, the administration of potassium iodide and perchloride of mercury by mouth and the intravenous injection of nov-arseno-billon.

#### Obstructive Dyspnoea.

DR. BLIGH's third patient was a child of three and a half years of age. She had been admitted to hospital on May 15, 1922, with dyspnoea which had come on suddenly after drinking a cup of coffee the same morning. She had suffered no previous illness. Examination on admission had revealed the presence of flushing of the face, dyspnoea, moderate recession of the infra- and supra-sternal regions, stridor and aphonia. The tongue, tonsils and pharynx had been normal in appearance. The temperature had been 36.6° C. (97° F.), the pulse one hundred and eight and the respirations thirty-six in each minute. There had been

no abnormal dullness in the chest, but rhonchi had been audible over both lungs. Nothing abnormal had been detected in the circulatory, alimentary or renal systems. Ten thousand units of anti-diphtheritic serum had been given. No Klebs-Löffler bacilli had been found in a throat swabbing.

On May 26, 1922, the dyspnoea had been much easier except for occasional attacks. X-ray examination of the larynx had failed to reveal a foreign body. Emetics had been given without relief. Laryngoscopic examination had failed to reveal anything abnormal. Owing to urgent dyspnoea tracheotomy had been performed on June 9, 1922. Relief had been immediate, but nothing abnormal had been felt. Four days later a small piece of celluloid had been found on the dressing. No further trouble had been experienced and the wound had healed and the voice returned to normal. The child had been discharged from hospital on June 26, 1922.

#### Myelocytæmia.

DR. F. GUY GRIFFITHS showed a female patient, aged forty-nine years, whom he had first seen in April, 1921. At that time the patient had been weak, pale and slightly bronzed as a result of arsenic medication and X-ray therapy. Her spleen had been huge and her leucocytes had numbered one hundred and sixty thousand in each cubic millimetre. The patient had not been able to remember whether her disease had been named leucocythæmia or myelocytæmia. She had not been able to remember these names, but had only been able to think of "pernicious anæmia." Her former physician, Dr. Lillies, of Armadale, Melbourne, had, however, when applied to, kindly confirmed the diagnosis of myelocytæmia. Dr. Griffiths mentioned this incident to illustrate how extraordinarily difficult it was for laymen to give a correct report of medical opinions.

The patient had been admitted to the Royal North Shore Hospital of Sydney on April 14, 1921, complaining of headache, giddiness and always feeling tired. She had been breathless on exertion and her legs had swollen occasionally. The anterior border of her spleen had been five centimetres below the costal margin.

On April 23, 1921, the blood had been of very good colour and consistence. It had flowed poorly and clotted readily. The red blood corpuscles, of good shape and colour, but rather small in size, had numbered over five million in each cubic millimetre. No nucleated cells had been seen and no polychromasia had been present. The leucocytes had numbered one hundred and sixty thousand in each cubic millimetre. The differential leucocyte count had shown the poly-morpho-nuclear cells to be 50%, the large mononuclear cells to be 39%, basophile cells to be 2% and myelocytes 9%.

On May 6, 1921, at the Royal North Shore Hospital of Sydney the red cells had numbered four million, seven hundred and one thousand, the hæmoglobin value had been 75% and the colour index 0.8. The leucocytes had numbered one hundred and thirty-six thousand.

On April 27, 1922, the red cells had numbered four million, one hundred thousand in each cubic millimetre, the hæmoglobin value had been 75% and the colour index 0.9. The leucocytes had numbered one hundred and ninety-one thousand, two hundred and fifty. The red cells had been normal in size and shape. No nucleated red cells had been seen. The high leucocyte count had been due mainly to an increase of granular forms. Numerous neutrophile myelocytes but no premyelocytes had been seen.

Treatment had consisted in the oral administration of iron and arsenic and in exposure to X-rays. The patient had been discharged relieved from hospital on July 7, 1922, complaining of cough with pain and swelling of the ankles. Slight fever had been present at various intervals until discharged. The spleen had been at the level of the umbilicus. On June 6, 1922, the leucocytes had numbered one hundred and twenty-eight thousand, seven hundred and fifty. This increase had been due to the great number of granular forms present. Numerous neutrophile myelocytes and immature neutrophile cells had been seen. Neither premyelocytes nor nucleated red cells had been seen.

#### Mitral Stenosis.

DR. GRIFFITHS also showed a female patient, aged thirty-two years, who had been admitted to hospital on September 9, 1922, with a diagnosis of recurrent acute rheumatism. The patient had given a history of three attacks of rheumatic fever in twenty-two years. Signs of failing heart had become manifested in February, 1922. On admission to hospital the patient had had no fever, but had complained of severe pain in the left shoulder, unaccompanied by swelling or redness. Slight dyspnoea had been present, a presystolic bruit had been audible on examination of the heart and malleolar œdema had been present. The absence of other signs of arthritis had suggested that the pain in the left shoulder might be anginal and a sudden attack of terrifying precordial pain two weeks later had confirmed this.

#### Anterior Polio-Myelitis.

DR. GRIFFITHS'S third patient was a girl, nine years of age, who had been admitted to hospital on July 4, 1922, with a history of fever, pains in the back and limbs, especially the right leg, and temporary retraction of the head. The medical attendant had first feared meningitis; later the severity of the pain in the right leg, especially below the knee, had led him to make a provisional diagnosis of osteo-myelitis. After admission to hospital the fever had subsided in a few hours and X-ray examination had shown no disease of the bones. The calves had been tender and foot-drop had subsequently appeared. At the time of demonstration the patient was doing well and was under the care of Dr. H. R. G. Poate. Dr. Griffiths pointed out that severe pains often occurred in patients suffering from anterior polio-myelitis, but that it was unusual to find them of this high intensity.

#### Chronic Pneumonia.

DR. GRIFFITHS also showed a male patient, thirty-nine years of age, a miner, who had been admitted to hospital on July 26, 1922, complaining of cough, pain in the left side of the chest and shivering attacks for the previous two weeks. On admission the patient had been extremely ill and had been unable to give a connected history. He had been very thin and weak. Examination on admission had shown that the chest was large and moved freely and equally and that it was resonant throughout. Numerous coarse rhonchi had been present, especially at the right base. The apex beat had been neither visible nor palpable, no abnormal cardiac signs had been detected and the pulse had been very rapid, weak and of low tension. On August 7, 1922, the breathing had been very distressed and the expansion of the left side of the chest anteriorly had been much less than on the right side. Slight dullness had been present on the left side in the second, third and fourth intercostal spaces, continuous with the cardiac dullness. The dull area had not reached the clavicle nor beyond its right margin. It had not extended into the axilla. Vocal resonance had been diminished over this dull area and the breath sounds had been vesicular but distant. At the bases there had been no dullness, the breath sounds had been vesicular and numerous crepitations had been present. Examination of the blood at this stage had shown a leucocyte count of twenty-two thousand, five hundred. The differential count had shown the neutrophile cells to be 77%, the eosinophile cells 2%, lymphocytes 17%, basophile cells 2% and large mononuclear cells 2%. On September 5, 1922, the red cells had numbered five millions in each cubic millimetre, the hæmoglobin value had been 70% and the colour index 0.69. The leucocytes had numbered thirteen thousand, five hundred. A Wassermann test had failed to yield a reaction by the ordinary method, but had yielded a delayed reaction by the ice-box method. On September 15, 1922, the patient's condition had been unchanged, the area of dullness had not altered and rhonchi had been audible all over the dull area. Fever, which had previously been of a hectic type, had been absent since September 11. There had been at that time very free expectoration of greenish sputum, with no sign of blood. The patient had on various occasions suffered from mental confusion. He had various delusions and talked incoherently. On September 25, 1922, the patient's condition had greatly improved, but some mental confusion had still been present. Dr. Griffiths pointed out



that no tubercle bacilli had been found in the sputum, though this had been submitted to examination more than twenty times. At the time of demonstration the patient was improving while taking a simple expectorant mixture containing potassium iodide and using an inhalation of creosote and carbolic acid.

#### Hydatid of the Lung.

DR. GRIFFITHS also showed a man, eighteen years of age, a labourer, who had been admitted to hospital on September 15, 1922, complaining of "spitting up blood" for the previous eighteen months. The patient had been born in England and had been in Australia for ten years. The family history and the patient's previous history had contained nothing of importance. The first indication of the present illness had occurred eighteen months previously, when the patient had coughed up blood. This had been bright in colour and had followed a sharp attack of coughing. At the same time he had complained of slight pain in the left side of his chest and had been admitted to Auburn Hospital for two weeks. The patient had had three similar attacks, the last occurring two days before admission. There had been no loss of weight and no history of night sweats. Examination on admission had shown him to be a robust young man, well nourished and of a good colour. There had been slight dullness at the apex of the right lung, both anteriorly and posteriorly. The breath sounds had been harsh in this area, but vesicular in type. Nothing abnormal had been detected in the circulatory system. A few days after admission the patient had coughed up a small grape-like cyst with thin, tough, fibrous walls—a typical echinococcal cyst. He had then admitted having coughed up four similar cysts on previous occasions. Since admission the sputum had been blood stained, but there had been no free hæmoptysis. No reaction, either local or general, had been obtained after the injection of old tuberculin in doses of 0.001, 0.005 and 0.01 cubic centimetre administered on September 6, 9 and 13, 1922, respectively. X-ray examination of the chest had failed to show any abnormality. No scolices nor tubercle bacilli had been found in the sputum and the pathological report had shown the cyst wall to present the typical laminated appearance of an echinococcal cyst.

#### Bronchitis, Emphysema and Bronchiectasis.

DR. GRIFFITHS also showed a male patient, aged fifty-six years, who had complained of cough for the previous eighteen months. The patient had lived mostly in New South Wales, but had spent a few years in the Gulf country in Northern Queensland. The patient had given a history of pneumonia and empyema twenty years previously and of asthma with frequent attacks of "influenza" for the previous twelve years. The patient had been subject to colds for the previous eighteen months. The cough had at times been troublesome and the sputum had been profuse and offensive. He had lost considerably in weight, had suffered no night sweats nor shivering attacks, nor had he coughed up any blood. Three weeks before admission to hospital he had got much worse, had felt very weak and had noticed increased shortness of breath on exertion. There had been no swelling of the feet, no fainting, no precordial pain, nor had there been any abnormal urinary symptoms. Examination had shown the patient to be very emaciated. He had a well marked *pyorrhæa alveolaris*. The chest was wide, long and somewhat flattened. Expansion had been at a maximum of 1.25 centimetres at the nipple line. The chest had been super-resonant on percussion, cardiac dullness had been absent and no abnormal dullness had been detected. On August 20, 1922, bronchial breathing had been audible at the right apex, both anteriorly and posteriorly. Numerous coarse râles had been heard and both pectoriloquy and bronchophony had been present. On September 16, 1922, the same area had shown broncho-vesicular breathing, feeble whispering pectoriloquy and a few râles after coughing. The cough had been then much less. Dr. Griffiths pointed out that no tubercle bacilli had been found, though sought on numerous occasions, and that the patient was doing very well on inhalations of carbolic acid and creosote.

#### Tabes Dorsalis.

DR. GRIFFITHS also showed a man, aged fifty-five years, who had been admitted to hospital on April 7, 1922, complaining of a feeling of coldness all over the body and limbs, unsteadiness in walking and standing, loss of memory, difficulty in talking and a sensation of weight on the head. He had given a history of malaria fifteen years before, but had denied having contracted venereal disease. His present illness had commenced two years ago, when he had begun to feel tired and dull. Numbness and coldness in the hands had then appeared and subsequently the symptoms complained of on admission. Examination had shown him to be a good colour and well nourished. Nothing abnormal had been detected in the respiratory, circulatory or urinary systems. Examination of the nervous system at the time of demonstration showed the patient to be intelligent. His speech was monotonous, slow and slurred. The pupils were unequal and contracted and reacted slowly to light, but well to accommodation. Horizontal and vertical nystagmus was present. The other cranial nerves were normal. There was delayed sensation over both arms and legs. Sensation for touch was defective, as was also that for heat and cold. Sense of localization was absent. The sense of passive movement and position was present. There was slight astero-ignostic ataxia of both extremities. Rombergism was present. He was unable to stand erect on one foot and unable to turn quickly. Insensibility of the ulnar nerve trunks was present. No paresis nor atrophy of muscles was present. Knee jerks were absent. There was a flexor response to a plantar stimulus and the organic reflexes were normal. Dr. Griffiths pointed out that the honorary ophthalmic surgeon had reported that the discs were normal, that the fundi appeared healthy and that there was no evidence of arterio-sclerosis in the vessels. The honorary rhinologist had reported the presence of atrophic rhinitis and a diminution of translucency of the right maxillary antrum. The antrum had been drained. The honorary pathologist had not been able to obtain a reaction to the Wassermann test. Dr. Griffiths said that he had made a provisional diagnosis of *tabes dorsalis*.

#### Insular Sclerosis.

DR. GRIFFITHS'S last patient was a man, aged thirty-three years, who had complained of general weakness for the previous month. The patient had been born in England and had lived in New South Wales for thirteen years. He had been in Africa nine years ago for a period of eight months. He had never lived in the tropics. He had suffered scarlet fever at seven years of age and diphtheria at twelve. The patient had had a nervous breakdown three years previously. This had taken the form of gradual weakness coming on for about twelve months. Finally a fainting attack had been followed by some loss of power in the left leg and by deviation of the tongue to the left. The patient had denied having contracted venereal disease. He had suffered from a right-sided facial paralysis seven years before. For three months prior to admission to hospital the patient had been subject to attacks of diarrhæa. The motions had never been blood-stained, but the patient had experienced great difficulty in controlling the sphincters. At the time of admission to hospital the patient had complained of general weakness with shortness of breath on the slightest exertion. He had complained of feeling giddy occasionally. He had had no cough, precordial distress or œdema. There had been no urinary symptoms. At the time of demonstration there was no abnormality to be detected in the circulatory or urinary systems. There was dullness and bronchial breathing at the apex of the right lung posteriorly. Examination showed no loss of intelligence or of memory, though speech was slightly slurred. Horizontal nystagmus was present. The pupils reacted to light and accommodation and no optic neuritis or other changes were present in the fundi. Paresis of the right facial nerve was present. The tongue deviated to the left when protruded. The lower limbs showed paresis and rigidity, together with exaggerated reflexes. Ankle clonus was present and the plantar reflex was flexion. The upper limbs showed paresis and rigidity and increased reflexes. Rombergism was present. Sensation was normal. There was no incontinence of urine or feces and the swallowing reflex was normal. Dr. Griffiths drew

attention to the pathological reports. No tubercle bacilli had been found in the sputum as a result of three examinations. Examination of the blood had shown the red cells to number four million, nine hundred and fifty thousand in each cubic millimetre. The colour index had been 0.92 and the leucocytes had numbered eight thousand, one hundred and twenty-five. No ova of parasites or amœbæ had been found in the stools.

#### Diverticulum of the Bladder.

DR. R. J. SILVERTON demonstrated a series of cystograms made in two cases of diverticulum of the urinary bladder. The opaque fluid used had been a 10% solution of sodium bromide. Dr. Silvertton said that the symptomatology of this disease was often irregular and confusing. No doubt a considerable number of the undiagnosed and uncured cases of "cystitis" were due to diverticulum. It had been thought before cystoscopy had been carried out that one patient had been suffering from bladder stone. The cystoscope had revealed the orifices of two diverticula, one to the right of the right ureter and the other just behind the middle of the trigone. The cystogram showed that the sacs were only of moderate size, about three centimetres in diameter. In the second patient the predominating sign had been a urethral discharge, for which he had been treated for some time; there had also been difficulty in urination, scalding and occasional hæmaturia. The cystoscope had disclosed a typical diverticular orifice, about two centimetres wide, just outside the right ureter. Dr. Silvertton pointed out that the size of the orifice was no index of the size of the sac, for in this instance the sac was seen to be even larger than the bladder itself. In making the cystogram the surgeon had distended the bladder through a catheter with the bromide solution. He had then turned the patient on to the side opposite to the sac, so as to get a clear profile view of the whole of the sac and even its neck with the fluoroscopic screen. A plate had been taken in this position. The patient had then been directed to pass by natural urination all he could of the bromide solution, following which another plate had been taken. The latter showed the bladder practically empty, while the diverticulum remained just as full as before.

#### Ureteric Calculus.

DR. SILVERTON also showed the radiograms of a case of ureteric calculus successfully treated by the conservative method of cutting the ureteric mouth through the cystoscope and dilating the ureter. The interesting point was that in this patient the ureter had occupied a very medial position and the small calculus in it, being round in shape, had been looked on at first as a phlebolith. A short distance lateral to the calculus shadow, another shadow, ovoid in shape, had been seen. As this shadow had been in the usual line of the ureter, it had been thought to be due to the calculus, but eventually proved to be due to some extra-ureteric mass, probably a phlebolith. These observations had been confirmed after the passage of the stone by means of radiograms with an opaque catheter in the ureter.

#### Skiagrams.

DR. H. R. SEAR showed a number of interesting skiagrams of various pathological conditions.

#### Post-Diphtheritic Laryngeal Obstruction.

DR. E. M. HUMPHERY showed a male patient, aged five years, who had been admitted to the Royal North Shore Hospital of Sydney on May 29, 1921, suffering from severe laryngeal diphtheria. Tracheotomy had been performed before his admission. At the time of admission he had been very ill and the fauces, as well as the larynx, had been full of membrane. When this had cleared off, an attempt had been made to remove the tracheotomy tube, but he had not been able to breathe through his mouth. Intubation had been performed with the object of inducing him to do so. He had coughed up the tube several times and as he had almost choked each time, the tracheotomy tube had been re-inserted. The larynx at this time had been almost filled up with granulations. Six weeks after his admission he had been anesthetized and the tracheotomy wound lengthened downwards; the high operation had previously

been done. The tracheotomy tube had been pushed into a lower position and a probe threaded with silk and passed up into the mouth through the upper part of the wound had been pulled through and followed by a strip of gauze. This had been seen-sawed through the larynx in order to clear away the granulations. The intubation tube had been replaced and the tracheotomy tube left *in situ*. The intubation tube had been again expelled; in a few days the operation had been repeated and this time the lower granulations had been scraped with a small spoon and a No. 12 metal urethral bougie passed up into the mouth to make sure that the passage was clear. A hole had been drilled in the lower end of an intubation tube, to which had been fastened a thin silver wire. This had been brought out of the wound and fastened to a tape. After twenty-four hours the tracheotomy tube had been taken out. The patient had again become frightened as soon as he felt his breath in his mouth; it had been necessary to watch him closely. He had soon, however, become accustomed to the altered conditions and the intubation tube had been removed after a few days. He had made a good recovery. At the time of demonstration he was well, had grown considerably and had no respiratory disability; he had a good voice and could talk and shout quite well.

Dr. Humphery said that about three weeks after this child had been brought in, another boy, aged five and a half years, had been admitted with the same condition. The same treatment had been used, but, not being so easily frightened, the boy had not given so much trouble and had recovered and had left before the first boy had had his tube removed. Dr. Humphery expressed his regret at not being able to show the second boy, as he had gone away to the country. The result in this case had been better than that of the boy demonstrated.

#### Fish Bone In Throat.

DR. HUMPHERY also showed a male patient, aged thirty-one years, who had been brought to the casualty room at the Royal North Shore Hospital of Sydney on August 28, 1922, with a fish bone sticking in his throat. His condition had been desperate; he had looked terrified, had been breathing with great difficulty and had been almost black with cyanosis. On putting his finger into his throat, Dr. Humphery had felt the bone easily; one end had been sticking into the back wall of the pharynx and the other had been fixed against the back of the epiglottis. It had been removed without difficulty by following along the finger with a pair of Kelly's forceps. A sharp hæmorrhage had immediately commenced, as if the bone had perforated a small vessel and had kept it plugged. The laryngeal spasm had become worse. An attempt had been made to intubate him and had failed; he had then been given some chloroform, but in about two minutes from the removal of the bone he had choked and had become unconscious. Tracheotomy had been performed; on his trachea being opened a quantity of blood had been coughed up, giving him immediate relief. He had been restless and delirious through the night and had been given 0.016 gramme (one-quarter of a grain) of morphine hypodermically; next morning he had become quite sensible. He had been discharged on August 9, 1922, with the wound almost healed.

Four days later he had experienced pain in the right side of the chest at the site of a dull area about ten centimetres (four inches) in diameter, had commenced to cough and expectorate muco-pus and during the next two days had coughed up about one and a half litres of foul smelling pus. The signs in the chest had disappeared and the patient had recovered. A peculiar staining of the skin of the face and upper part of the chest, extending in the shape of a V to the level of the nipples, had been noted for about two weeks after the accident. The stain had the bruise-like appearance of the discoloration frequently seen after asphyxia. The patient had had the bone in his throat for about two hours before his admission to hospital. He had attempted to push it down with the handle of a table knife. Dr. Humphery expressed the opinion that in this attempt the patient had forced the bone into the position in which it had been found.

### Septicæmia and Blood Transfusion.

DR. H. LEAVER showed a female patient who had been suffering from septicæmia and had been treated by blood transfusion. The report will be published in a subsequent issue.

### Non-Union of Fracture.

DR. H. R. G. POATE showed a schoolboy, aged thirteen years, who had been brought to the hospital by his father in June, 1922, because of a deformity of the right forearm which had been gradually increasing for twelve months. The only history had been that he had fallen two years previously and "sprained" the right wrist, which had been very swollen, but not painful, for some days. No particular notice had been taken of the accident, because he had suffered no pain. He had always been a healthy, active boy. The deformity of the forearm at the time of admission had consisted of marked bowing of the radius with the convexity to the outer side, so that the hand was displaced medially. There had appeared to be no trace of the ulna in the lower third, except the head. X-ray examination had shown that there was a gap of some seven centimetres between the spindle-shaped ends of the ulna, with a marked bowing of the radius, which was also thicker than normal. The actual cause of the condition had been obscure, but Dr. Poate thought that there must have been a fracture of the ulna in its lower fourth at the time of the accident two years previously. Lack of any efficient splinting in the early stages, with probable damage to the vascular supply, had resulted in non-union. Growth of the radius had brought about increasing separation of the ends of the ulna, which had undergone a process of osteoporosis. The weight of the hand had led to the usual adduction deformity. On July 3, 1922, a plastic operation had been performed on the lower part of the radius, aiming at restoring normal alignment and abduction of the hand to the usual position.

This having proved successful, a second operation had been carried out on September 25, 1922, when a large bone graft had been taken from the tibia and fixed to the head of the ulna below and to the proximal half of the ulna above by kangaroo tendon. The upper limb had been encased in plaster. A skiagram taken at the time of demonstration revealed the graft in good position, with surrounding callus formation. Dr. Poate regarded the prognosis as satisfactory.

### Gummatous Synovitis of Knee Joint.

DR. POATE also showed a female patient, aged twenty-three years, a children's nurse, who had attended hospital on October 2, 1922, complaining of swelling of the right knee joint for the previous six months. There had been no history of injury nor of any disease apart from the usual childish complaints. There had been no pain in the joint, but lately it had ached a little at night. The swelling had varied to a slight extent and there had not been any tenderness or inflammatory signs. Upon examination the knee had appeared swollen and the whole synovial area had stood out sharply. No fluctuation had been elicited and the swelling had been moderately firm and elastic, so much so that the suprapatellar enlargement could be lifted in the fingers. No other joints had been affected. The range of movement had not been impaired. A diagnosis of gummatous infiltration of the synovial membrane of the joint had been made. The patient gave a positive reaction to the Bordet blood test for syphilis and at the time of demonstration the condition was clearing up rapidly under the usual forms of treatment.

Dr. Poate said that he had shown this patient on account of the unusual nature of the condition. It was only the fourth of its kind that he had recognized. One previous example had affected the ankle and two others the knee. In each instance one joint only had been affected and there had been no definite history of syphilis, except in one man, who had had two months' anti-syphilitic treatment eighteen years previously and had since become the father of three apparently healthy children.

### Tuberculous Disease of Hip and Thumb.

DR. POATE's third patient was a man, aged twenty-three years, a farm labourer, who had been admitted to hospital

on June 9, 1922, complaining of pain in the right hip on and off for three years, but much worse in the previous two months. In this period of time he had had night sweats and had lost about thirteen kilograms in weight. The usual clinical signs of arthritis of the hip joint had been in evidence and a diagnosis of tuberculous disease of the hip had been made. This had been confirmed by X-ray examination, which had shown the head of the femur slightly eroded. Examination of the chest had failed to reveal any abnormality. The limb had been on extension and pain had immediately ceased. After nearly three months in bed, when preparations had been made for putting the limb into plaster, he had developed signs of inflammatory trouble in the metacarpo-phalangeal joint of the left thumb and the hip had shown signs of relapse. X-ray examination later had shown the thumb condition to be tuberculous and a recent skiagram of the hip had shown extensive bony destruction of the joint. Inflammatory signs had cleared again since extension had been applied and the left thumb put up in plaster.

Dr. Poate said that it was very disappointing that the patient should have had a relapse in such a fashion, just when all had seemed to be going well. At the time of demonstration his general condition had improved and, although fever had occurred at the time of relapse, his temperature had been normal for some weeks.

The best result to be hoped for was ankylosis of the affected joints, but it would be at least eighteen months before the patient could be allowed to put any weight on the inferior extremity.

### NOMINATIONS AND ELECTIONS.

THE undermentioned have been elected as members of the New South Wales Branch of the British Medical Association:

GORDON, JAMES BRUCE, M.B., Ch.M., 1922 (Univ. Sydney), Western Suburbs Cottage Hospital, Croydon.

RYAN, JAMES REDMOND, M.B., Ch.M., 1922 (Univ. Sydney), Esk Street, Lithgow.

TAHMINDJIS, GEORGE, M.B., Ch.M., 1922 (Univ. Sydney), 151, Elizabeth Street, Sydney.

THE undermentioned have been elected members of the Queensland Branch of the British Medical Association:

BRAKE, CLIFFORD ERROL, M.B., Ch.B., 1922 (Univ. Sydney), Toowoomba Hospital.

GALLAGHER, WILLIAM PATRICK, M.B., 1922 (Univ. Sydney), Brisbane.

SIROIS, EUCHARISTE, C.M., M.D., Univ. Bp's Coll., Montreal, 1883, Marburg.

THE undermentioned has been elected as a member of the South Australian Branch of the British Medical Association:

JONES, BRYNMOR BEVERIDGE, M.B., B.S., 1921 (Univ. Adelaide), Adelaide.

### AUSTRALASIAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE SIXTEENTH MEETING OF THE AUSTRALASIAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE will be held at the Victoria University College, Wellington, New Zealand, from January 9 to 15, 1923. The President of the Association is MR. G. H. KNIBBS, C.M.G., Director of the Commonwealth Institute of Science and Industry, and the Honorary Secretary for the Wellington meeting is MR. W. R. B. OLIVER, F.L.S., F.Z.S., Dominion Museum, Wellington. There will be twelve sections, including six at which medical subjects will be discussed. The subscription of £1 is payable at the time of enrolment. Further information will be published in a later issue.



## Correspondence.

### DIATHERMY AND RADIO-THERAPY.

SIR: As the discussion is becoming personal and not informative, we had better end it. With regard to Dr. Flecker's case, it would be well for him to wait a couple of years before making rash statements.

Yours, etc.,

W. KENT HUGHES.

22, Collins Street, Melbourne,  
November 17, 1922.

SIR: I should like to add my testimony in support of all that Dr. Molesworth has written on the curability of rodent ulcer by radio-therapeutic treatment. My only excuse for doing so is that I have been practising this method successfully since 1900, probably longer than anyone else in Australia, and in my experience to say that 90% of rodent ulcers are curable in this way is probably an under-estimate, certainly if one only treated cases not too far advanced, where the bone and cartilage are still unaffected, 95% would be nearer the truth. In the course of the last twenty years my failures have been so few that they are easily remembered and in each case there was a special reason.

For instance, one was in a young man of twenty-eight, admitted a difficult age to cure; in this case the rodent ulcer had been most thoroughly excised by one of our leading surgeons. It rapidly recurred, was passed on to me and, as X-rays failed to retard, I soon passed it on for radium, which also failed and he subsequently died.

Old-standing cases, where involvement of bone and cartilage are concerned, have hitherto constituted the bulk of failures and these are cases of neglect that should not occur and it is good news if, as Dr. Flecker says, these can now be cured by intensive X-ray therapy. It certainly appears very probable.

There are none so blind as those that won't see and I think that Dr. Kent Hughes is inclined to be a bit blind to facts now well known to others in regard to the curability of rodent ulcers by X-rays, for there are not many diseases in which we can claim so large a proportion of success. Contrast the position of twenty-five years ago; what were the prospects before a patient with rodent ulcer then? Why had it been named "*Noti me tangere*"?

Yours, etc.,

T. G. BECKETT.

132, Nicholson Street, Fitzroy,  
Melbourne, November 20, 1922.

### MEDICAL LIBRARIES.

SIR: The thanks of every Australian medical student are due to you for your leading article in the issue of November 11 on the absence of a good medical reference library in the various Australian capitals. It is not only a grave reproach to our profession generally, but also a serious drawback to every research worker or medical practitioner who wishes to keep abreast of the times. I cannot speak definitely of other Australian cities, but I do know that if all the books in the so-called medical and allied libraries in Melbourne were put together, they wouldn't form one decent medical library. It is surely bad enough that the books in each library are so few and in many cases the editions so old, but their value even then is greatly diminished because of the restrictions placed upon their use. The Medical Library is not always available and is frequently closed. During one Christmas vacation I thought I would be able to revel in some of the books at the Medical School Library, but on going there I was told one of the professors had taken the keys of the library with him and that he would be away for six weeks—and he was away for that time. In former days medical practitioners and students were allowed to inspect the books in the medical section of the Public Library;

now that privilege is withdrawn and, in order to obtain a glance at a book from it, it is necessary to make a special request and wait till it is brought down from the higher stories.

It is hard to say which is the worst medical library here, but as far as books are concerned I believe that of the B.M.A. merits this unenviable distinction, though that of the Medical School is not far removed from it. As far as journals are concerned, the B.M.A. Library has a fair number, though there are some notable examples missing.

When Professor Berry was President of the local B.M.A. he emphasized the need of a good medical reference library and I then suggested to the B.M.A. that the method proposed in your leading article, *viz.*, the pooling of the money now spent independently by the various medical and allied libraries and that the librarians of each should decide after consultation what books they would buy, so as to avoid overlapping, but nothing was done. Now, however, as these are the days of "pools," the suggestion may be better received. Your idea of centralizing in one building all the money spent on medical works is excellent; indeed, with the limited funds at the disposal of each body, it seems the only practical solution.

Your second suggestion is already followed to an extent by some of our local men, but on such a small scale that it does very little to improve present conditions. The objection is that most of the journals referred to are taken by specialists and as every specialist so often wishes to refer to a back number, he is very loath to part with his journals. It would be far better to concentrate on your first proposal and as a step in that direction surely we can copy the example set by Adelaide and get the University and B.M.A. authorities to unite in this matter. Hoping some practical results will follow from your article.

Yours, etc.,

JAS. BOOTH.

Melbourne, November 21, 1922.

### PUERPERAL INFECTION.

SIR: Puerperal infection will, I understand, be fully considered early next year. Dr. John Morton's courteous, confident, constructive criticism establishes an excellent precedent and example. Destructive criticism alone wastes precious time. Our united aim should be to improve results.

Dr. Morton's contention conclusively proven will be welcomed, since it is based upon practical experience and will lessen the present morbidity and mortality of women. I trust that he will give full expression to his views and record his results.

Yours, etc.,

WILLIAM T. CHENHALL.

Sydney (undated).

## Obituary.

ERIC HERBERT PIKE.

It is with regret that we have to announce the death of Dr. Eric Herbert Pike, which took place at Bellingen, New South Wales, on November 23, 1922.

## Proceedings of the Australian Medical Boards.

NEW SOUTH WALES.

THE NEW SOUTH WALES MEDICAL BOARD conducted an inquiry into a charge of infamous conduct in a professional respect which was brought by the Crown against Dr. Frederick Sobieski Wladimir Zlotkowski on October 16,

1922. The findings of the Board were read by the President on November 2, 1922. The respondent immediately gave notice of an appeal against the findings to the Supreme Court. We are now informed that the appeal has been abandoned. In these circumstances a full report of the inquiry will be published in THE MEDICAL JOURNAL OF AUSTRALIA next week.

### QUEENSLAND.

THE undermentioned have been registered under the provisions of the *Medical Act of 1867* as duly qualified medical practitioners:

- ALEXANDER, JAMES BUCHANAN, M.B., B.S., 1922 (Univ. Melbourne), Brisbane.  
 BROWN, JAMES, M.B., Ch.B., Edin., D.P.H., Camb., Toowoomba.  
 COFFEY, JOHN, L.R.C.P. & S., Edin., L.F.P.S., Glasg., 1905; D.P.A., R.C.P.S., Irel., 1906; F.R.C.S., Edin., 1915, Brisbane.  
 FOOTE, LEONARD HARDWICK, M.B., Ch.M., 1922 (Univ. Sydney), Brisbane Hospital.  
 SWANWICK, DORIS ISABEL, M.B., Ch.M., 1922 (Univ. Sydney), Rockhampton.  
 WILSON, KENNETH JOSEPH GILMORE, M.B., Ch.M., 1922 (Univ. Sydney), Brisbane Hospital.

### Books Received.

- DISEASES OF THE HEART: A HANDBOOK FOR STUDENTS AND PRACTITIONERS, by I. Harris, M.D., L.R.C.P. (Ed.); 1922. London: Baillière, Tindall & Cox; Demy 8vo., pp. xii. + 196, with fifty figures in the text. Price: 10s. 6d. net.  
 MENTAL DEFICIENCY (AMENTIA), by A. F. Tredgold, M.D., M.R.C.P., F.R.S. (Ed.); Fourth Edition, revised and enlarged; 1922. London: Baillière, Tindall & Cox; Demy 8vo., pp. xx. + 570, with 31 plates. Price: 21s. net.  
 PARALYSIE FLASQUE DU MEMBRE SUPERIEUR PAR POLIOMYELITIS ANTERIEURE (PARALYSIE INFANTILE), TRAITEMENT ORTHOPEDIQUE ET CHIRURGICAL, par le Docteur Louis Mencières; 1921. Paris: J. Dumoulin; Crown 4to., paper cover, pp. 55, with 84 figures.

### Medical Appointments.

DR. J. B. BELL (B.M.A.) and DR. D. G. STEWART have been appointed Public Vaccinators at Rochester and at Toora respectively, in Victoria.

DR. G. R. TROUP has been appointed Junior Resident Medical Officer at the Perth Hospital, Western Australia.

DR. EILEEN M. HIGGINS (B.M.A.) has been appointed District Medical Officer and Public Vaccinator at Corrigin, Western Australia.

DR. G. G. NICHOLLS (B.M.A.) and DR. PETER LALOR have been appointed Acting Superintendents of the Hospitals for the Insane at Ararat and Sunbury respectively, in Victoria.

DR. L. J. J. NYE (B.M.A.) has been appointed a Medical Referee under *The Workers' Compensation Acts, 1916 to 1921*, of Queensland.

### Medical Appointments Vacant, etc.

FOR announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xviii.

BROKEN HILL AND DISTRICT HOSPITAL: Senior and Junior Resident Medical Officers.

DEPARTMENT OF PUBLIC HEALTH, NEW SOUTH WALES: Third Government Medical Officer.

SYDNEY HOSPITAL: Honorary Relieving Assistant Ophthalmic Surgeon and Honorary Assistant Aural Surgeon.

### Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429, Strand, London, W.C.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 30 - 34, Elizabeth Street, Sydney	Australian Natives' Association Ashfield and District Friendly Societies' Dispensary Balmalm United Friendly Societies' Dispensary Friendly Societies' Lodges at Casino Leichhardt and Petersham Dispensary Manchester Unity Oddfellows' Medical Institute, Elizabeth Street, Sydney Marrickville United Friendly Societies' Dispensary North Sydney United Friendly Societies People's Prudential Benefit Society Phoenix Mutual Provident Society
VICTORIA: Honorary Secretary, Medical Society Hall, East Melbourne	All Institutes or Medical Dispensaries Australian Prudential Association Proprietary, Limited Manchester Unity Independent Order of Oddfellows Mutual National Provident Club National Provident Association
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane	Brisbane United Friendly Society Institute Stannary Hills Hospital
SOUTH AUSTRALIA: Honorary Secretary, 12, North Terrace, Adelaide	Contract Practice Appointments at Renmark Contract Practice Appointments in South Australia
WESTERN AUSTRALIA: Honorary Secretary, Saint George's Terrace, Perth	All Contract Practice Appointments in Western Australia
NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington	Friendly Society Lodges, Wellington, New Zealand

### Diary for the Month.

- DEC. 5.—New South Wales Branch, B.M.A.: Ethics Committee.  
 DEC. 5.—Victorian Branch, B.M.A.: Ballot Papers Returned.  
 DEC. 6.—Victorian Branch, B.M.A.: Annual General Meeting.  
 DEC. 6.—New South Wales Branch, B.M.A.: Branch.  
 DEC. 8.—Queensland Branch, B.M.A.: Annual Meeting.  
 DEC. 8.—South Australian Branch, B.M.A.: Council.  
 DEC. 9.—Eastern District Medical Association, New South Wales.  
 DEC. 12.—New South Wales Branch, B.M.A.: Executive and Finance Committee.  
 DEC. 13.—Western Australian Branch, B.M.A.: Council.  
 DEC. 13.—Melbourne Pediatric Society.  
 DEC. 13.—South Sydney Medical Association, New South Wales.  
 DEC. 14.—Victorian Branch, B.M.A.: Council.  
 DEC. 14.—City Medical Association, New South Wales: Annual Meeting.  
 DEC. 19.—New South Wales Branch, B.M.A.: Medical Politics Committee; Organization and Science Committee.  
 DEC. 22.—Queensland Branch, B.M.A.: Council.  
 DEC. 28.—Brisbane Hospital for Sick Children: Clinical Meeting.

### Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, B.M.A. Building, 30-34, Elizabeth Street, Sydney. (Telephone: B. 4635.)

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